

TSW SF 1.4

Report
**Site Investigation/
Surface Waste Removal**

**Former Iron Foundry Area
South Tacoma Swamp**

**TIP Management, Inc.
Tacoma, Washington**

**K/J/C 866738
May 1988**



Kennedy/Jenks/Chilton

Kennedy/Jenks/Cilton

Consulting Engineers

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3 April 1989

Mr. Thomas R. Anderson
Tacoma Industrial Properties
CS 2259
1123 Port of Tacoma Road
Tacoma, WA 98401

Subject: Report on Site Investigation/Surface Waste Removal
Former Iron Foundry Area
5202 S. Proctor Street
Tacoma, Washington
K/J/C 866738.00

Dear Mr. Anderson:

Enclosed is the report on our site investigation/surface waste removal at the former iron foundry area, 5202 South Proctor, Tacoma, Washington.

This study has been prepared in accordance with our professional services agreements of 30 September 1986 and 22 October 1987.

Please call us if you have any questions about the information presented in this draft report.

Very truly yours,

KENNEDY/JENKS/CHILTON



Nathan A. Graves
Manager, Industrial Services

NAG:kae/38

Enclosure

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SITE INVESTIGATION/SURFACE WASTE REMOVAL
TACOMA INDUSTRIAL PROPERTIES
FORMER IRON FOUNDRY AREAPage No.

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EXECUTIVE SUMMARY

PROJECT PURPOSE/OBJECTIVES

This report describes environmental studies performed at the Tacoma Industrial Park area located within the boundaries of the South Tacoma Channel Superfund site, Tacoma, Washington. The purpose of this report is to describe field investigations, and evaluate chemical data in the area of a former iron foundry and the surrounding area.

EXTENT OF CHEMICAL COMPOUNDS AT THE SITE

Several documents produced as a result of past site investigations and chemical data generated by Kennedy/Jenks/Chilton were reviewed to assess chemical contamination onsite. Inorganic and organic contaminants were found in site soil, sediment and groundwater at generally low concentrations. Inorganic chemical concentrations were found to be above background soil levels in shallow subsurface soil at one location (lead, copper, cadmium, and zinc) and in four samples of storm drain sediments (lead). It is believed that the inorganics in the soil are limited in extent and relatively immobile, based on nearby soil data and the expected mechanisms that tend to bind metals to soils. A leach test (EP toxicity) was conducted on the sediment sample containing the highest lead concentration and indicated that the lead is expected to be relatively immobile in the sediments.

Organic contaminants detected in site soil and groundwater were generally well below applicable regulatory criteria. The exception was xylenes, which were slightly above WDOE standard cleanup levels at one location near the former solvent shed.

REMOVAL OF WASTE PRODUCTS

Waste materials stored in drums and small containers have been characterized and removed from the site. The wastes were generally composited, based on their characteristics, in order to transport the material in bulk to a permitted disposal facility.

CONCLUSIONS/RECOMMENDATIONS

Contamination at the former iron foundry appears to be limited and is comprised of inorganic compounds in storm drain sediments in one storm drain and in shallow subsurface soil in one location; and organic compounds in shallow soil near the former solvent shed. The removal of the visually stained soils near the solvent shed should be considered, although current risks from this material appear low. WDOE could request the removal of the contaminated soil, based on a recently utilized cleanup level of 200 mg/kg total oil and grease, which the soil is likely to exceed. In addition, the presence of solvents could make removal prudent, due to possible future concerns regarding ingestion or inhalation of the contaminants.

EXECUTIVE SUMMARY, continued

The removal of contaminated storm drain sediments should also be considered, as cleanout of the drains is relatively easy to accomplish. This would eliminate the possibility of contaminated sediments being washed downstream during high rainfall events.

Based on available field data and available data regarding historical site operations, the site appears to have had a minimal impact on overall groundwater quality in the South Tacoma Channel area.

SECTION 1

INTRODUCTION

1.1 PURPOSE

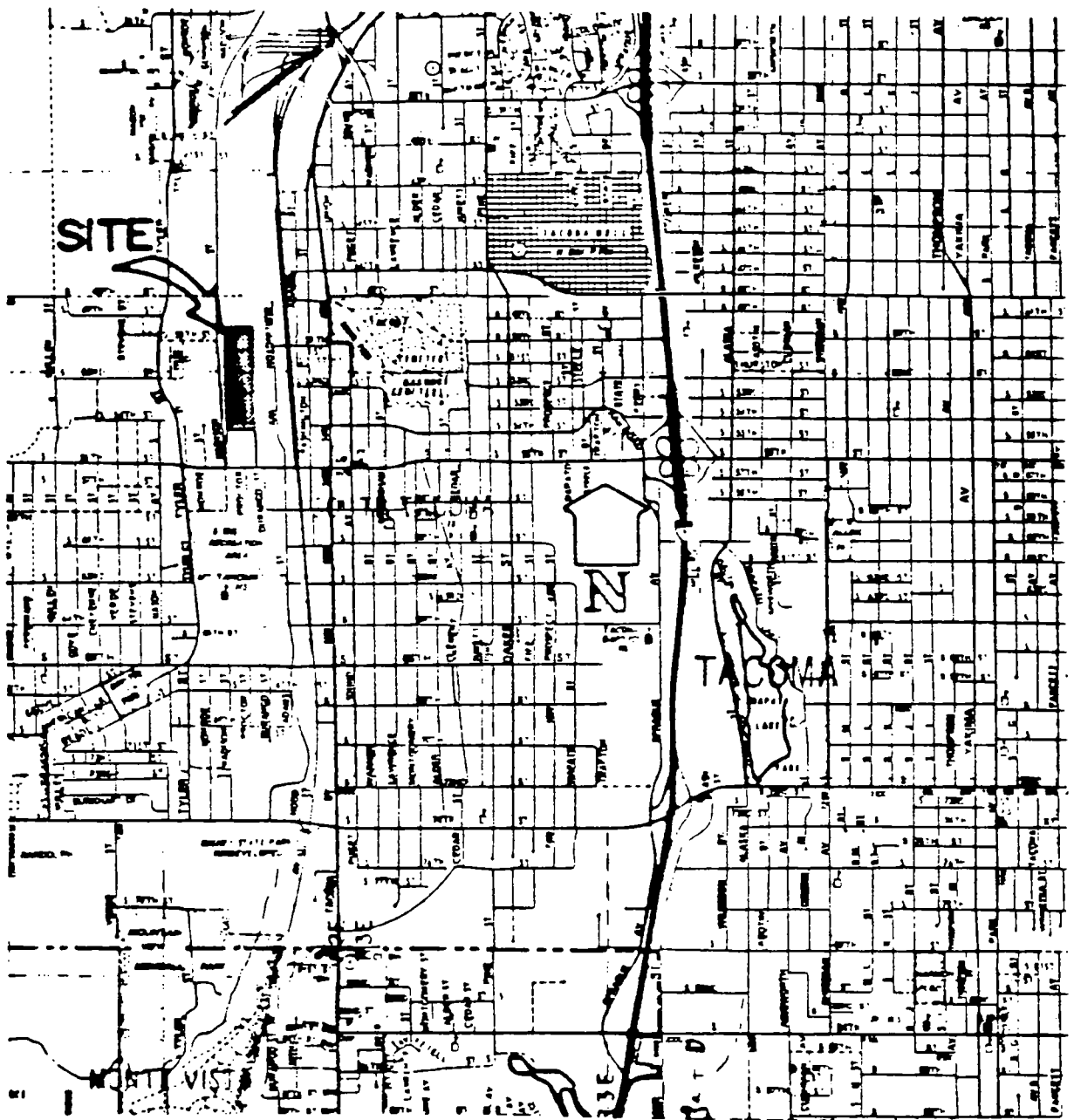
This report represents the culmination of several site assessments by numerous parties related to chemical compounds in soil, sediments and groundwater in the Tacoma Industrial Park area, 5202 S. Proctor Street, Tacoma, Washington. The purpose of this report is to describe field investigations, and evaluate chemical data in the area of a former iron foundry and the surrounding property. An evaluation of chemical concentrations in the vicinity of the adjacent brass foundry was contained in Kennedy/Jenks/Chilton's "Draft Report, Remedial Investigation/Risk Assessment/Feasibility Study, Former Brass Foundry Area", Volumes I and II, and will not be addressed in this report.

Data utilized to form the basis of our site investigation is contained in several documents produced as the result of past site investigations. These documents are listed below:

- o Pierce, D., and Rogers, S., Tacoma Pierce County Health Department, 1982, "South Tacoma Industrial Waste Summary," Tacoma, Washington.
- o Black & Veatch, 1983. Preliminary Site Investigation, South Tacoma Swamp, Tacoma, Washington.
- o Benlab, 1985. "Resource Evaluation of Anderson Enterprises South Tacoma Property."
- o Earth Consultants, 1985. "Report on Soil Sampling and Chemical Testing." Anderson Enterprises Property, Tacoma, WA.
- o Black & Veatch, 1985. Memorandums to EPA/WDOE.
- o Ecology and Environment, 1985. Memorandums and Data Analyses Sheets.

Kennedy/Jenks/Chilton has reviewed these documents and concludes that previous site investigations were conducted in accordance with generally accepted investigation procedures. Based on information contained in these reports, referenced field sampling and analytical techniques should provide adequate data to form the basis for additional investigations. We assume that all data presented in these reports are accurate as stated.

The specific objectives of Kennedy/Jenks/Chilton's study of the iron foundry area were as follows:



Not to Scale

Kennedy/Jenks/Chitto

Tacoma Industrial Property

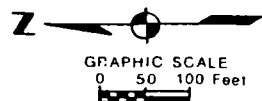
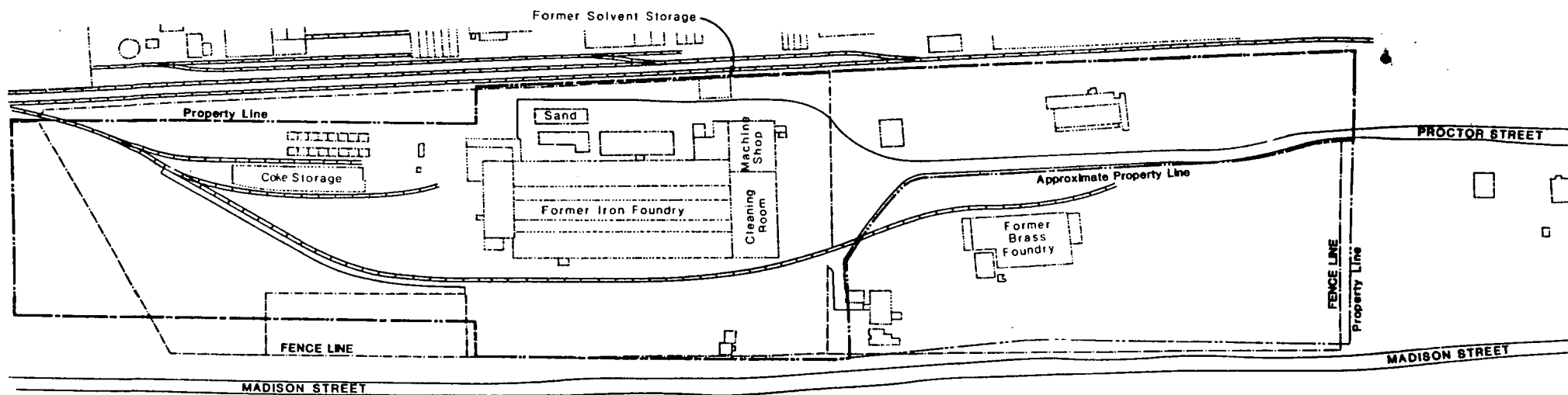
Tacoma, Washington

Location Map

K/J/C 86673

February 198

Figure 1-



Kennedy/Jenks/Chilton
Tacoma Industrial Properties
Tacoma, Washington
Tacoma Industrial Park Site

K/J/C 880738
February 1988
Figure 1-2

- o Assessment of the extent of chemical compounds throughout the area of the former iron foundry based on the review of previous site investigations.
- o Assessment of the extent of chemical compounds in surface and subsurface soils, storm drain sediments and groundwater near the former iron foundry, former solvent storage area and near the reported location of an underground fuel tank.
- o Assessment and evaluation of the environmental risks posed by chemical compounds found onsite.
- o Gross characterization and compatibility testing of materials found in drums/containers onsite in preparation of compositing for disposal offsite at a permitted facility.
- o Detailed analyses of container/drum contents.
- o Resident engineering during the removal of containerized materials for offsite disposal.
- o Development and evaluation of site specific remedial action alternatives, if required, based on the information obtained during the site investigation.

1.2 SITE DESCRIPTION

The former iron foundry plant (subject of this report) is located north of South 56th Street and east of Madison Street, Tacoma, Washington, as shown in Figure 1-1. The plant site is shown in Figure 1-2. The adjacent site, containing the former brass foundry (no longer owned by Tacoma Industrial Properties), is not assessed in this report.

The former iron foundry plant is situated in a localized mixed commercial/industrial setting, and is currently zoned for light industrial (M-2) (Anderson, 1986). The areas north and immediately west of the site are undeveloped, with the areas south and east of the site primarily used for commercial and light industrial activities. The closest area with a large residential population is located approximately one-third of a mile southwest of the site. A few residences are located one-quarter of a mile northeast of the site. The site has been owned by Tacoma Industrial Properties (formerly Anderson Enterprises) since 1974.

The site is located on the floor of an erosional channel that was occupied by a major glacial meltwater stream during the waning stages of the last glaciation of this region, approximately 13,000 years ago. This four-mile long meltwater valley is locally referred to as the "South Tacoma Channel". The channel is incised as much as 150 feet below the rolling upland area that is occupied by residential and commercial districts of Tacoma. The channel

extends north and east of the former iron foundry area to the vicinity of the intersection of South Tacoma Way and Yakima Avenue. South of the study area, the glacial channel widens and opens into a broad glacial outwash plain that is underlain by highly permeable gravel.

The "South Tacoma Swamp" is located immediately north and west of the former iron foundry area. This lowlying portion of the valley floor has been partly filled and drained.

No creeks or streams are present in the vicinity of the property. The headwater area of Flett Creek is presently approximately 6,000 feet south of the site. Flett Creek drains into Chambers Creek and then into Puget Sound.

The Tacoma-Pierce County Health Department has completed a regional geohydrologic study of the Clover/Chambers Creek drainage basin. The results of that study are included in a July 1985 report prepared by Brown and Caldwell entitled, "Clover/Chambers Creek Geohydrologic Study". The Brown and Caldwell report indicates that the site is located in an area where potential contamination of the shallow and deep aquifers is possible. The report also indicates a groundwater flow direction that is generally westward in the vicinity of the site.

Numerous water wells have been drilled in and near the South Tacoma Channel. The well logs on file at the Tacoma-Pierce County Health Department were researched to determine the approximate location and capacity of wells within one mile of the site.

The City of Tacoma owns several municipal wells in a well field located 3,000 to 7,000 feet north-northeast of the site. Some of these wells are capable of yields in excess of 3,000 gpm. This well field does not appear to be downgradient of the site.

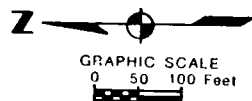
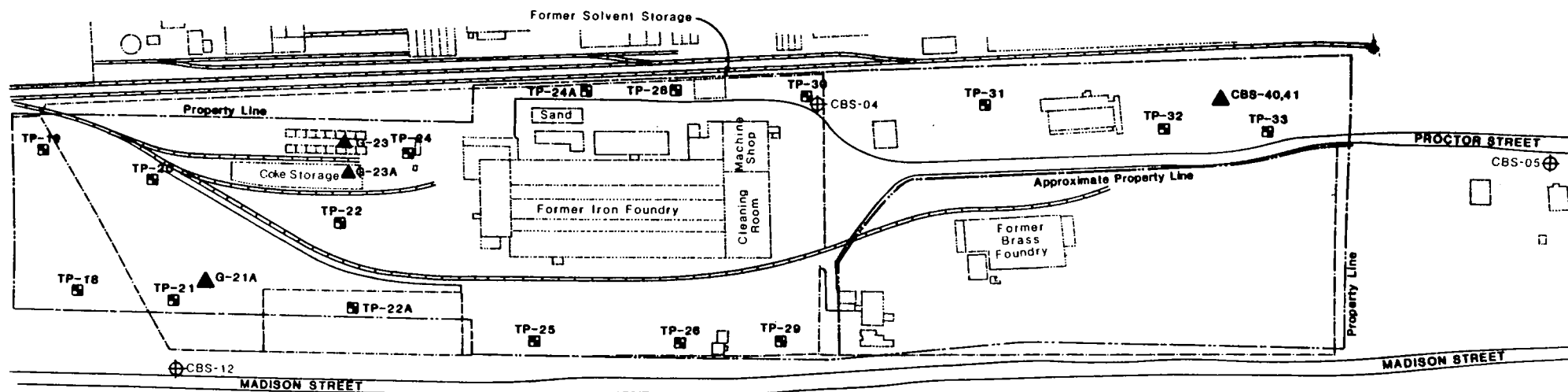
The Town of Fircrest owns three municipal wells located 8,000 to 10,000 feet northwest of the site. Based on information presented in the Brown and Caldwell report, these wells are not located downgradient from the site.

The University Place Water Company owns three public supply wells located approximately 8,000 feet northwest of the site. These wells do not appear to be located downgradient from the site.

Based on available well records, the closest well in the reported downgradient direction is located approximately 2,500 feet west of the site. This private well at 5402 South Mullen Street is 110 feet deep and has a high reported iron content.

1.3 SITE HISTORY

Griffin Wheel, a division of Amsted Industries, bought the former foundry facility and surrounding plant from the American Foundry



LEGEND

- +
 Previously Installed Test Pit
- ⊕
 Approximate Location and Number of EPA Monitoring Well
- ▲
 Previous Surface Soil Sample Location

Kennedy/Jenks/Chilton

Tacoma Industrial Properties
Tacoma, Washington
Tacoma Industrial Park Site
Previous Sampling Locations

K/J/C 866738

February 1988

Figure 1-3

Company in January, 1897. American Foundry used the plant as a foundry from October, 1890 to 1896.

Griffin Wheel operated two foundries until 1957. The foundry building in the northern portion of Tacoma Industrial Park produced iron wheels until 1957, when the railroads switched to steel wheels. (This building is currently being utilized for other manufacturing activities). The former brass foundry located to the south of the property (not a subject of this report) produced journal bearings until April 1980.

In addition to reviewing past site investigation reports, a review of available aerial photographs of the site was performed. Local aerial photographers were contacted and photographs of the site were obtained. Each photograph was examined for visible indications of contamination (discolored soils) and for indications of activities which may have resulted in site contamination. Dates of the photographs that were reviewed and a discussion of relevant site characteristics and/or activities are provided below.

- o 1946 - Iron foundry appears to be operating (wheels are stacked outside of building). Northern Pacific maintenance yards present east of site.
- o 1961, 1969, 1974 - No significant change from 1946.
- o 1985 - No significant change around iron foundry. Northern Pacific railyards demolished. General Plastics constructed (east of iron foundry).

1.4 HISTORY OF PREVIOUS SITE INVESTIGATIONS

- o October 1982 - Black & Veatch performed a preliminary site investigation on the South Tacoma Swamp for the USEPA. The investigation included collection of soil and groundwater samples near the former iron foundry site as shown on Figure 1-3. Applicable sample type and locations relevant to the former brass foundry area include the sampling of groundwater from monitoring wells CBS-04, CBS-05, and CBS-12.
- o November 1982 - Black & Veatch resampled the groundwater in wells CBS-04 and CBS-12 as part of the follow-up sampling conducted in the South Tacoma Swamp.
- o February 1985 - Benlab and Earth Consultants sampled soil from backhoe pits and assessed the depth and nature of the fill materials in those areas. Figure 1-3 indicates the test pit locations. Benlab analyzed soil samples for total lead and total arsenic.
- o September 1985 - Soil samples collected during the February 1985 study were analyzed for EP Toxicity lead and arsenic; and

additionally for mercury, cadmium, chromium, silver, barium, and selenium on selected samples.

- o June 1985 - Black and Veatch and Ecology & Environment resampled the EPA groundwater wells installed in 1982. The sampling effort included wells CBS-04 and CBS-12.

1.5 RESULTS OF PREVIOUS SITE INVESTIGATIONS

Black & Veatch, 1982 and Ecology & Environment, 1985. The results from Black & Veatch's preliminary site investigation (1982) are presented in Tables 1-1 and 1-2. Although methylene chloride, bis(2-ethylhexyl) phthalate and acetone were detected in very small quantities in some samples, they were not shown in the tables. These compounds are common lab contaminants, and may have been detected due to field and laboratory contamination during this investigation. However, quality assurance data is unavailable to confirm this conclusion.

Results of Chemical Concentrations in Groundwater Samples.

Groundwater monitoring wells installed by Black & Veatch in 1982 and sampled in 1982 and 1985 include CBS-04, CBS-05, and CBS-12 (Figure 1-3). In relation to the former iron foundry area, CBS-04 and CBS-05 can be considered "upgradient" wells and CBS-12 a "downgradient" well, based on the general northwestern groundwater gradient as reported by Black & Veatch. Priority pollutants detected in upgradient wells CBS-04 and CBS-05 in 1982 include trichloroethylene and zinc. Priority pollutants detected in downgradient wells include pentachlorophenol, 1,1,1-trichloroethane, tetrachloroethylene, zinc, and cyanide. The organic priority pollutants listed above were all detected in trace quantities in the samples, below the quantification limit.

Black and Veatch and Ecology & Environment resampled CBS-04 (upgradient) and CBS-12 (downgradient) in 1985. No organic priority pollutants were detected in either well, including those compounds detected in 1982. In addition, cyanide was not detected in groundwater from well CBS-12. Several priority pollutant metals were detected in groundwater samples from both CBS-04 and CBS-12 (including zinc, as previously detected in 1982); however, most compounds were detected in trace quantities (below quantifiable limit) or concentrations were suspect due to excess holding times prior to sample analyses (Ecology & Environment, Inc., 1985).

Discussion of Chemical Concentrations in Groundwater Samples. The presence of 1,1,1-trichloroethane, tetrachloroethylene and trichloroethylene in 1982 sampling could be a result of documented contamination in the City of Tacoma's South Tacoma well field (Well 12-A) from property in the vicinity of Time Oil Company, northeast of the site, or from documented contamination from the City of Tacoma landfill located west of the site. However, this conclusion cannot be confirmed based on available data. These

compounds were not detected during the 1985 sampling effort at CBS-12 (detection limits in 1985 were also higher). This indicates that groundwater in the vicinity of CBS-12 may not be continuing to be degraded over time by these compounds.

Priority pollutant metals are common elements of the earth's crust and their presence in groundwater is common at low concentrations. The significance of the levels of priority pollutant metals in groundwater was investigated by comparing groundwater concentrations with available drinking water standards as shown on Table 1-2. (Drinking water standards are used because of the use of area groundwater for municipal and private drinking water). For compounds with drinking water standards, all levels detected in groundwater from CBS-04 and CBS-12 are below drinking water standards.

The source of cyanide, which was detected at CBS-12 during one sampling event in 1982, is unknown. However, cyanide was not detected in CBS-12 during a second sampling event in 1982. The levels of cyanide detected in 1982 (17 ppb) is below the level of public health significance (200 ppb) as reported by the U.S. EPA (EPA, 1980). In addition, cyanide was not detected in CBS-12 in 1985.

Chemical Concentrations in Soil Samples. Chemical compounds detected in soil samples from the installation of Black & Veatch's monitoring wells and the collection of surface soil samples in 1982 are summarized in Table 1-3. The inorganic priority pollutants detected in soils from the monitor wells and the one surface soil sample (CBS-40) were consistently low in concentration and well within typical ranges of these metals in soils. However, some metals in soil just below the surface at one location (CBS-41) were high, namely cadmium (1.7 ppm), lead (4300 ppm), copper (2800 ppm) and zinc (1800 ppm). Inspection of the logs for test pits installed by Earth Consultants, 1985, in the area of the elevated metals, showed a material described as "dark sand with metallic luster" at depths of 1-1/2 feet and 8-9 feet in two test pits (TP-32 and TP-33). The high metals concentrations could be associated with this material. EP toxicity analyses both above and below the metallic sand resulted in non-detectable quantities of leachable lead and arsenic, indicating the reduced mobility for these compounds. In addition, soil at only one location exhibited these high levels of metals, indicating limited contamination.

Organic priority pollutants were not detected in soil from monitor well CBS-04. Trichlorofluoromethane was only detected in soil from CBS-12 at 13.5 feet at trace concentrations (6.0 ppb). Trichloroethylene was only detected at trace concentrations (32 ppb) in the surface soil sample (CBS-40). Organic compounds which were also detected at trace concentrations but which were below the specified detection limit were fluoranthene, chrysene, phenanthrene (CBS-41) and pyrene (CBS-40, CBS-41).

TABLE 1-1

SUMMARY OF PRIORITY POLLUTANT ANALYSIS OF GROUNDWATER SAMPLES (a)
TIP MANAGEMENT - IRON FOUNDRY SITE

TACOMA, WASHINGTON

Sample Location Well Number	Upgradient CBS-04		Upgradient-Offsite CBS-05		Downgradient CBS-12		Drinking Water Standards (b)
	10/20/82	11/11/82	10/19/82	11/04/82	10/21/82	11/10/82	
Pentachlorophenol	ND	ND	ND	ND	3.0 (c)	ND	---
1,1,1-Trichloroethane	ND	ND	ND	ND	6.7 (c)	9.2 (c)	200
Tetrachloroethylene	ND	ND	ND	ND	3.5 (c)	3.0 (c)	0
Trichloroethylene	2.1 (c)	ND	ND	ND	ND	ND	5.0
Zinc	ND	160	ND	650	32	100	5000
Cyanide	ND	ND	ND	ND	17	ND	200 (d)

Notes:

All units are ppb.

a - Black & Veatch, June, 1983.

b - National Primary & Secondary Drinking Water Regulations, 52 FR 41546 and 51 FR 11412.

c - Below quantitation limit.

d - U.S. Public Health Service, 1968.

ND - Not detected.

All other priority pollutants were not detected, except for methylene chloride, bis (2-ethylhexyl) phthalate, and acetone, which are suspected lab contaminants.

TABLE 1-2

SUMMARY OF INORGANIC PRIORITY POLLUTANT ANALYSES OF GROUNDWATER SAMPLES (a)
TIP MANAGEMENT - IRON FOUNDRY SITE

TACOMA, WASHINGTON

Sample Location Well Number Date	Upgradient CBS-04 06/20/85	Downgradient CBS-12 06/20/85	Drinking Water Standards (b)
Antimony	52 (c)	70	NA
Barium (d)	26	11 (c)	1000
Cadmium	4	3.6 (c)	10
Copper	15 (c)	20	1000
Lead	2.4 (c,e)	2.4 (c,e)	50
Mercury	0.20 (e)	0.20 (e)	2
Silver	9.6 (c,e)	9.6 (c)	50
Thallium	2.6 (c,e)	2.6 (c,e)	NA
Zinc	128 (e)	37 (e)	5000

Notes:

All data reported in ppb.

All other inorganic priority pollutants were not detected.

NA - None Available

a - Ecology and Environment, Inc., 1985.

b - National Primary & Secondary Drinking Water Regulations,
52 FR 41546 and 51 FR 11412.c - Material not detected - number is estimated sample
quantitation limit.d - Not a priority pollutant, however barium is a regulated
drinking water contaminant.e - Value is an estimated quantity because quality control
criteria were not met.

TABLE 1-3
SUMMARY OF PRIORITY POLLUTANT ANALYSES OF SOIL SAMPLES (a)
TIP MANAGEMENT - IRON FOUNDRY SITE
TACOMA, WASHINGTON

Sample Location Date Depth (ft)	CBS-04		CBS-12		CBS-40	CBS-41	Typical Soil Range (b)	EPC's (c)
	10/11/82 17.8	10/11/82 37.8	10/13/82 13.5	10/13/82 28.5	10/18/82 Surface	10/18/82 1.0		
Organics								
Fluoranthene	ND	ND	ND	ND	ND	0.4 (d)	---	---
Chrysene	ND	ND	ND	ND	ND	0.4 (d)	---	---
Phenanthrene	ND	ND	ND	ND	ND	0.4 (d)	---	---
Pyrene	ND	ND	ND	ND	0.4 (d)	0.4 (d)	---	---
Trichlorofluoromethane	ND	ND	0.006	ND	ND	ND	---	15.500
Trichloroethylene	ND	ND	ND	ND	0.032	ND	---	1.477
Inorganics								
Arsenic	ND	ND	1.3	1.1	2.3	6.7	1-50	---
Cadmium	0.2	0.2	ND	ND	0.2	1.7	0.01-0.7	---
Chromium	1.3	2.2	ND	ND	ND	ND	1-1000	---
Copper	ND	ND	ND	ND	20	2800	2-100	---
Lead	1.0	1.3	3.9	1.3	54	4300	2-200	---
Nickel	ND	4.6	ND	ND	ND	ND	5-500	---
Zinc	1.9	5.0	6.2	2.9	11	1800	10-300	---

Notes:

All units are ppm. ND - Not Detected.

All other priority pollutants were not detected, except for methylene chloride and acetone, which are suspected lab contaminants.

a - Black & Veatch, June 1983.

b - Lindsey, W.L., Chemical Equilibria in Soil, Wiley & Sons, New York, 1979.

c - Estimated Permissible Concentrations, US EPA, "Multimedia Environmental Goals for Environmental Assessment", Vols. I, II, EPA 600/7-80-041.

d - Detected below, but greater than one half the specified detection limit.

Benlab, 1985

Benlab only analyzed one subsurface and one surface sample for total lead and arsenic near the iron foundry. Soil from a depth of 4.5-6 feet in TP-25 contained lead at 477 ppm and arsenic at 0.04 ppm. The arsenic level is below its typical soil range, while the lead exceeds its typical range in soil. EP toxicity analyses of the same sample (Table 1-5) resulted in non-detectable lead, indicating its immobility in the soil system.

Earth Consultants, 1985

EP toxicity analyses of soil samples were performed to assess chemical concentrations at the site compared with one regulatory criteria. The EP toxicity analysis is a test that indicates the relative "leachability" of a compound under acidic conditions (simulating sanitary landfill leachate). This test does not generally simulate leachability in the normal environment, but the test is used to assess proper disposal practices for wastes.

The results of EP toxicity analyses, on soil, performed by Earth Consultants (1985) are shown in Table 1-4 (lead and arsenic), and in Table 1-5 (lead, arsenic, mercury, cadmium, chromium, silver, barium and selenium). Arsenic, mercury, cadmium, chromium, silver, barium and selenium were not detected. Lead was detected in four samples at trace concentrations. None of the samples had concentrations exceeding the State of Washington's dangerous waste criteria for lead.

SUMMARY

Trace levels of organic priority pollutants were detected in site soil and groundwater in two prior studies at the iron foundry plant site. Analyses for metals in site groundwater detected zinc in both sampling rounds, with additional metals detected in 1985 sampling event. All of these metals concentrations were well below drinking water criteria. Metals were also detected in site soil, with concentrations within typical soil levels, except for one location. One shallow soil sample contained elevated levels of cadmium, copper, lead and zinc. However, these levels appear to be limited in extent and exhibit limited mobility. EP toxicity analyses of site soil (lead and arsenic) for comparison to Dangerous Waste criteria showed the soil is not a Dangerous Waste. Arsenic was not detected, using EP toxicity test, while lead was detected in trace concentrations at four locations.

It appears that inorganic site contamination is confined to one localized area around CBS-41, while organic contamination appears to be at trace levels in both soil and groundwater at CBS-12, in soil at CBS-40, and groundwater at CBS-04. However, an onsite source of groundwater contamination cannot be confirmed, and contaminants may be present as a result of several documented sources nearby the site.

TABLE 1-4

SUMMARY OF EP TOXICITY LEAD AND ARSENIC IN SOIL SAMPLES (a)
TIP MANAGEMENT - IRON FOUNDRY SITE

TACOMA, WASHINGTON

Test Pit	TP-18	TP-18	TP-18	TP-19	TP-19	TP-21 *	TP-21	TP-22	TP-22A	TP-24	TP-24	TP-24A	Dangerous Waste
Depth (ft)	0-2	1-1.5	8-10	0-1.5	8-9	0-1	7-9	10-12	2-4	0-1	7-8	0-1	Criteria (b)
Lead	<0.1	<0.1	<0.1	0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	5-500
Arsenic	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	5-500

Test Pit	TP-24A	TP-25 *	TP-25 *	TP-25 *	TP-26	TP-26	TP-28	TP-28	TP-28	TP-29	TP-29	TP-29	Dangerous Waste
Depth (ft)	1-2	1-3	4.5-6	13-14	3-5	16-17	0-0.5	2-3	6-7	2-3	2-4	5-7	Criteria (b)
Lead	<0.1	<0.1	<0.1	<0.1	0.3	<0.1	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	5-500
Arsenic	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	5-500

Test Pit	TP-29	TP-30	TP-30	TP-31	TP-31	TP-32	TP-32	TP-33	TP-33	G-21A	G-23	G-23A	Dangerous Waste
Depth (ft)	13-14	0-1	7-8	0-1	6-7	1-1.5	2-3	2-4	9-11	Surface	Surface	Surface	Criteria (b)
Lead	<0.1	0.4	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	5-500
Arsenic	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	5-500

Notes:

a - Earth Consultants, 1985.

b - Dangerous Waste Criteria, Chapter 173-303 WAC, amended June 1987.

* - Selected for additional EP Toxicity metals analyses.

TABLE 1-5

SUMMARY OF EP TOXICITY ANALYSES OF SOIL SAMPLES (a)
TIP MANAGEMENT - IRON FOUNDRY SITE

TACOMA, WASHINGTON

Test Pit Number Depth (ft)	TP-21 0-1	TP-25 1-3	TP-25 4.5-6	TP-25 13-14	Dangerous Waste Criteria (b)
Lead	<0.1	<0.1	<0.1	<0.1	5-500
Arsenic	<0.1	<0.1	<0.1	<0.1	5-500
Mercury	<0.01	<0.01	<0.01	<0.01	0.2-20
Cadmium	<0.01	<0.01	<0.01	<0.01	1-100
Chromium	<0.01	<0.01	<0.01	<0.01	5-500
Silver	<0.01	<0.01	<0.01	<0.01	5-500
Barium	<1	<1	<1	<1	100-10,000
Selenium	<0.1	<0.1	<0.1	<0.1	1-100

Notes:

All data reported in ppm.

a - Earth Consultants, 1985.

b - Dangerous Waste Criteria, Chapter 173-303 WAC, amended June 1987.

SECTION 2

SITE INVESTIGATION

2.1 PROJECT OBJECTIVES

The purpose of Kennedy/Jenks/Chilton's additional site investigation of the former iron foundry and the surrounding plant was to gather the additional data necessary to assess the risks posed by chemical compounds on the site, as well as to form the basis for evaluating remedial action alternatives, if required. To gather this data, several evaluations or investigations were conducted as listed below:

- o Review of past site investigations.
- o Development and performance of soil, sediment, and groundwater investigations to fill gaps in the database.
- o Performance of containerized material investigations to establish material characteristics for offsite disposal.

The results of the investigations described above were then used to fulfill the overall objectives of the site investigation, which include:

- o Characterize the areal extent of chemical compounds in various site media,
- o Identify possible public health and/or environmental exposures posed by chemical compounds at the site,
- o Removal of drummed materials for offsite disposal, and
- o Identify remedial action needs.

2.2 SITE INSPECTION

A detailed walkthrough of the former iron foundry plant was performed to observe possible areas of visible surface soil contamination and to identify container storage areas. The results of our inspection and review of available site data were used to select appropriate sampling locations as needed to further identify the presence and extent of chemical contamination at the site.

Stained surface soils were present near a former solvent shed east of the foundry, and near a reported transformer oil storage area north of the foundry. Drums were sighted in several locations throughout the site. Numerous small containers were present within the former brass foundry building southwest of the iron foundry.

*biased
sampling*

PCBs?

2.3 FIELD INVESTIGATION PROCEDURES

2.3.1 Surface Soil Sampling

On 2 October 1986, samples of surface soils were collected in two locations near the former iron foundry: one near a reported former transformer oil storage tank and one by the former solvent storage area. Samples were collected using clean plastic scoops and were immediately transferred into clean glass jars and cooled, prior to shipment to Kennedy/Jenks/Chilton Laboratory Division under chain-of-custody procedures.

2.3.2 Storm Drain Sampling

On 9 and 10 October 1986, samples were collected from seven storm drains around the former iron foundry. Two of the drains (SD-2 and SD-5) did not contain any sediments, so grab water samples were collected. Sediments were collected from the other five drains. The sediment samples were collected using clean plastic scoops and immediately transferred into clean glass jars. The water was collected directly into clean glass jars. All storm drain samples were stored on ice and shipped to our Laboratory Division under chain-of-custody procedures.

2.3.3 Boring/Monitor Well Installations

On 11 November 1987, four soil borings and one monitoring well were completed at locations near the former solvent shed and the reported location of an underground fuel storage tank as shown on Figure 2-1. The drilling work was contracted to F.L.D. Industries located in Everett, Washington. A Kennedy/Jenks/Chilton engineer logged the boring operation and installation of the monitoring well. Well logs are presented in Appendix A. A truck-mounted drilling rig was used. Before work at the site began and between each boring, the drilling equipment was steam cleaned to reduce the likelihood of cross-contaminating the borings or samples. Soil samples were taken with a standard split-barrel sampler.

Borings B-1, B-2, and B-3 were drilled in areas of stained soil in the solvent storage area. The borings were terminated below the visually contaminated soil. Based on visual observations during these borings, an estimate of the volume of stained soil in this area was calculated to be approximately 2,000 cubic feet. Boring B-4 was positioned near the reported location of an underground gasoline tank. The tank bottom was measured to be 8 feet below the ground surface by using a weighted tape measure. The tank contained approximately 3-3/4 inches of liquid which had an odor of gasoline. The boring placed adjacent to the tank (B-4) was terminated 2-1/2 feet below the bottom of the tank. Gasoline odors were not detected in any of the soil samples or drilling cuttings. Monitoring well MW-5 was placed at a point

expected to be downgradient from the solvent storage area. MW-5 was constructed with 2-inch diameter PVC screen and casing. The screen was machine slotted and 20 feet long. A filter pack was placed surrounding the screen, and a bentonite seal was placed above the filter pack. The top of the well was sealed with a water-tight locking cap and covered with a traffic-rated monument cover. Details of the construction of this monitoring well are shown on the well log in Appendix A.

2.4 HYDROGEOLOGIC CONDITIONS

Subsurface soil conditions beneath the site were explored by drilling three shallow borings and one deeper boring. The shallow borings encountered sandy gravel fill extending to the base of the borings at approximately five feet. The deeper boring encountered fine sand with less than five percent gravel extending to the base of the boring at approximately eleven feet. In addition, a monitoring well was installed in a fifth boring. This boring encountered gravelly sand fill mixed with debris overlying gravelly sand which extended to approximately 32 feet. The gravelly sand unit was deposited by glacial meltwater during formation of the South Tacoma Channel. The base of the gravelly sand unit was not reached.

Groundwater conditions at the site were explored by installing one monitor well and utilizing monitor wells installed near the site by EPA in 1983. The water table elevations in the three EPA wells were measured on September 26, 1986. Groundwater occurs in an unconfined condition within the gravelly sand unit encountered in the wells. Based on water table elevation measurements, the groundwater flow direction beneath the site is generally north-westerly.

2.5 CHEMICAL CONCENTRATIONS/DATA EVALUATION

2.5.1 Surface and Subsurface Soils

Table 2-1 presents a summary of the chemical analyses results of the five surface and subsurface soil samples. Based on results of previous analyses and past use of the area, the only chemicals analyzed in these samples were organic priority pollutant compounds. Results of analyses showed only detectable levels of volatile organic compounds. The shallow soil sample (12-18 inches) from the area of the former solvent shed (GS-2) contained trace concentrations of 1,1,1-trichloroethane (0.55 ppm), tetrachloroethylene (0.3 ppm) and xylenes (5 ppm). To assess the extent of these compounds in subsurface soil near this location, soil from boring B-2 (depth of 5-6.5 feet) was analyzed and found to contain only 1,1,2-trichloro-1,2,2-trifluoroethane at 0.007 ppm. Comparison of site concentrations of these compounds with estimated permissible concentrations (EPCs), calculated by the EPA based on health effects in soil, showed site concentrations

TABLE 2-1

SUMMARY OF CHEMICAL ANALYSES OF SOIL SAMPLES (a)
TIP MANAGEMENT - IRON FOUNDRY SITE

TACOMA, WASHINGTON

Sample Location Depth (ft) Date	GS-2 1-1.5 10/2/86	SS-4 Surface 10/2/86	SS-6 Surface 10/17/86	B-2 5-6.5 11/12/87	B-4 9-10.5 11/12/87	EPC's (b)	WDOE Final Cleanup Policy Standard Protection	
Volatile Organics	(c)	NA	NA	(d)	NA			
1,1,1-Trichloroethane	0.55			<0.005		1.477	2.0	20.0
Tetrachloroethylene	0.3			<0.005		1.849	0.7	7.0
1,1,2-Trichloro-1,2,2-trifluoroethane	<0.1			0.007		20.976	N/A	N/A
Xylenes	5.0			<0.005		1.200	4.4	44.0
EPA Method 8270	ND (e)	ND (f)	NA	NA	NA	--	--	--
Purgeable Aromatics (g)	NA	NA	NA	NA	<0.001	--	--	--
PCBs	NA	NA	<0.001	NA	NA	--	--	--

Notes: ND - Not Detected. NA - Not Analyzed For. N/A - None Available.

All units are ppm.

a - Kennedy/Jenks/Chilton, 1986-87.

b - Estimated Permissible Concentrations, US EPA, "Multimedia Environmental Goals for Environmental Assessment," Vols. I, II.

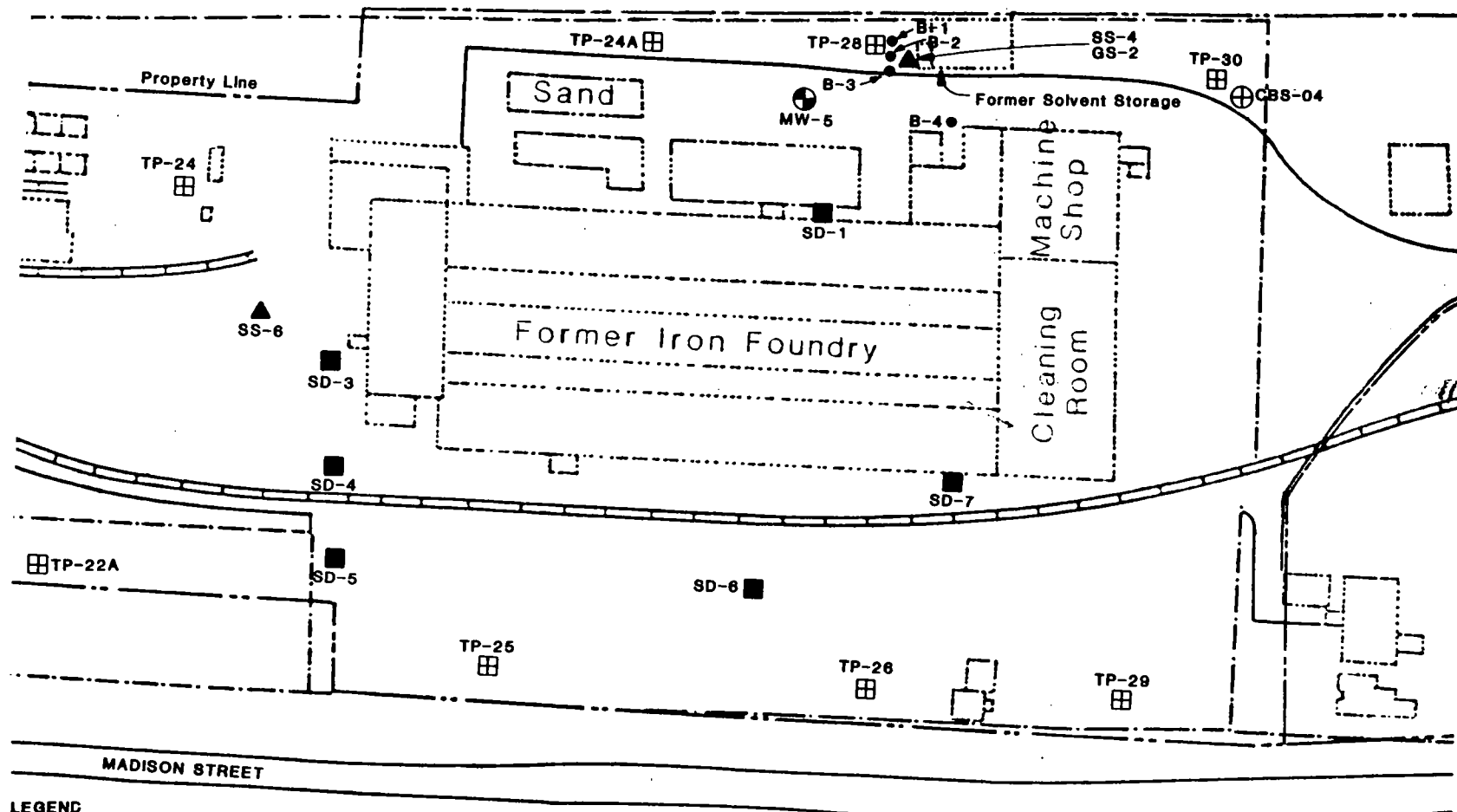
c - No other volatile organics were detected. Detection limits ranged from 0.1 to 2.0 mg/Kg

d - No other volatile organics were detected. Detection limits ranged from 0.005 to 0.03 mg/Kg.

e - Compound detection limits ranged from 0.2 to 1.0 mg/Kg.

f - Compound detection limits ranged from 2.0 to 10.0 mg/Kg.

g - Purgeable aromatic compounds were not detected. All of these compounds had a detection limit of 0.001 mg/Kg.



LEGEND

- Previously Installed Test Pit
- Approximate Location and Number of EPA Monitoring Well
- Surface Soil Sample Location
- Storm Drain Sample Location
- Soil Boring Location
- Monitor Well Location

Not to Scale



Kennedy/Jenke/Chilton
Tacoma Industrial Properties
Tacoma, Washington
Tacoma Industrial Park Site
Additional Sampling Locations

K/J/C 866738
February 1988
Figure 2-1

were many orders of magnitude less than the EPCs. EPCs were used due to the lack of available data regarding acceptable levels of organic compounds in soils. Calculations utilized to develop EPCs are shown in Appendix B.

The Washington Department of Ecology (Ecology) has presented a Final Cleanup Policy, which pertains to cleanup standards for chemical compounds in soil, groundwater, surface water, and air. The cleanup levels for soil are primarily based on multiplicative factors of water quality criteria or drinking water standards. The standard/background cleanup levels are ten times the water standard, while the protection cleanup level is 100 times the standard. The standard cleanup level essentially specifies the level at which a site is considered "clean." Protection cleanup levels are applicable only with long-term monitoring to assess that drinking water is not being degraded. Drinking water standards are available for 1,1,1-trichloroethane and xylenes. Since a drinking water standard is not available for tetrachloroethylene, an acceptable water concentration was calculated for tetrachloroethylene, (see Appendix B) using an acceptable increased cancer risk level of 10^{-5} and its carcinogenic potency slope. Comparison with site soil concentrations show that xylenes are slightly above the standard level, and none of the compounds are above the protection level. However, due to the limited area of contamination, we suspect that chemicals in soil will provide a minimal risk to groundwater, due to the small area of contamination and the high productivity of the underlying aquifer (thus diluting the contaminants). Ecology has also recently used a level of 200 mg/kg total oil and grease as a cleanup level on contaminated sites. It is likely that all the visually contaminated soil in the solvent shed area contains in excess of this level; therefore, Ecology could request that the material be removed for offsite disposal. This action may be prudent, considering the presence of solvents in the soil and possible future concerns regarding ingestion or inhalation of these compounds. However, current risks posed by these materials appear low.

Purgeable aromatic hydrocarbons (benzene compounds, toluene, xylenes) were not detected in soil from boring B-4, adjacent to an underground fuel storage tank. PCBs (polychlorinated biphenyls) were not detected in the surface soil sample (SS-6) taken near a reported transformer storage area. Analysis by EPA Method 8270 did not detect acid/base/neutral extractable organics in soil from GS-2 or SS-4 (from solvent storage area).

2.5.2 Storm Drain Sediments

Seven storm drain locations were sampled for lead and total petroleum hydrocarbon (TPH) analyses. The results of these analyses are presented in Table 2-2. Total lead concentrations in the sediments of four of the storm drains exceeded typical soil

TABLE 2-2

SUMMARY OF CHEMICAL ANALYSES OF STORM DRAIN SAMPLES (a)
TIP MANAGEMENT - IRON FOUNDRY SITE

TACOMA, WASHINGTON

Sample Location Type Date	SD-1 Sed. 10/9/86	SD-2 Water 10/9/86	SD-3 Sed. 10/10/86	SD-4 Sed. 10/9/86	SD-5 Water 10/9/86	SD-6 Sed. 10/9/86	SD-7 Sed. 10/9/86	Typical Soil Levels (b)
Total Lead (mg/Kg)	320	NA	530	96	NA	1200	310	2-200
Total Lead (mg/L)	NA	9.0	NA	NA	1.6	NA	NA	---
EP Toxicity (mg/L) Lead	NA	NA	NA	NA	NA	<0.5	NA	---
TPH (mg/Kg) (c) as Diesel Fuel as Kerosene	NA	NA	8.5	NA	NA	NA	61	---

Notes:

a - Kennedy/Jenks/Chilton, 1986.

b - Lindsey, W.L., Chemical Equilibria in Soil, Wiley & Sons, New York, 1979.

c - Total Petroleum Hydrocarbons.

NA - Not analyzed for.

levels for lead. One sediment sample was within the typical range. Lead concentrations varied from 96 ppm to 1200 ppm in sediments. The location with the highest lead concentration (SD-6) was further analyzed for EP Toxicity lead, to assess if the lead would leach from the sediments. The results indicate that the lead should be relatively immobile in the sediments. Two of the storm drain locations (SD-2, SD-5) did not contain sediments, therefore, water samples collected from these locations were analyzed for total lead, with results of 9.0 ppm and 1.6 ppm, respectively. These results probably do not indicate high levels of lead in the water itself, since samples contained high levels of solids. For comparison purposes, detected levels are better compared with typical soil levels in the environment.

Sediments at two locations were analyzed for TPH, SD-3 and SD-7. Diesel fuel was detected at SD-3, while kerosene was detected at SD-7, both at low concentrations.

2.5.3 Groundwater

In addition to re-sampling the monitor wells installed by Black & Veatch (CBS-04, -05, -12) and analyzing for copper and lead, one new well (MW-5) was installed and sampled solely for volatile organic priority pollutants in the downgradient direction from the former solvent shed. The results from these analyses are presented in Table 2-3.

Copper was not detected in either the dissolved or particulate state in any of the Black & Veatch wells. Total lead was detected in all three wells, with dissolved lead only present in CBS-04. All of the lead concentrations detected are below the drinking water criteria of 0.05 mg/l; however, the total lead concentration at CBS-12 is just above the proposed recommended maximum contaminant level (RMCL) of 0.02 mg/l.

Water from MW-5 was analyzed for volatile organic compounds to assess if contaminants from the former solvent shed had entered the groundwater. The only volatiles detected were trichlorofluoromethane (0.2 ppm) and 1,1,1-trichloroethane (0.034 ppm). Drinking water criteria for 1,1,1-trichloroethane (1,1,1-TCA) was not exceeded. Trichlorofluoromethane was not detected in soil samples near this location and no regulatory criteria is available for this compound, so site concentrations were compared with the EPA's estimated permissible concentrations (EPCs). Site concentrations for both compounds were several orders of magnitude less than their respective EPCs.

Conductivity, temperature, pH, and oxygen-reduction potential (ORP) were measured in CBS-04, -05, -12 to help characterize the groundwater. The pH and temperature were in the normal ranges. In addition, conductivity measurements were within the typical range of 50-1500 umhos/cm for potable water.

TABLE 2-3

COMPARISON OF GROUNDWATER CONTAMINANTS WITH REGULATORY CRITERIA (a)
TIP MANAGEMENT - IRON FOUNDRY SITE

TACOMA, WASHINGTON

Sample Location Date	MW-5 11/12/87	CBS-04 9/26/86	CBS-05 9/26/86	CBS-12 9/26/86	Drinking Water Standards (b)	Estimated Permissible Concentrations (c)
pH	NA	7.39	7.46	7.17	6.5-8.5	
ORP (mv) (d)	NA	443	273	460		
Conductivity (umhos)	NA	189	115	185		
Temperature (cel)	NA	10.3	11.5	12.0		
Inorganics						
Total Copper	NA	<0.01	<0.01	<0.01	1.0	
Dissolved Copper	NA	<0.01	<0.01	<0.01		
Total Lead	NA	0.02	0.02	0.03	0.05 (0.02 e)	
Dissolved Lead	NA	0.01	<0.01	<0.01		
Volatile Organics (f)						
Trichlorofluoromethane	0.2	ND	ND	ND	---	77.300
1,1,1-Trichloroethane	0.034	ND	ND	ND	0.2	7.383

Notes:

All units are ppm unless otherwise indicated.

a - Kennedy/Jenks/Chilton, 1986-87.

b - National Primary & Secondary Drinking Water Regulations, 52 FR 41546 and 51 FR 11412.

c - US EPA, "Multimedia Environmental Goals for Environmental Assessment," Vols. I & II, EPA 600/7-80-041.

d - Reported relative to standard hydrogen electrode.

e - Proposed RMCL, 50 FR 46936, November 13, 1985.

f - No other volatiles detected. Detection limits ranged from 0.01 to 0.06 mg/L.

NA - Not Analyzed

2.5.4 Public Health and Environmental Concerns

Data generated by Kennedy/Jenks/Chilton and others during numerous investigations of the former iron foundry plant site have shown that although some contaminants are present in site soil and groundwater, concentrations are generally below applicable criteria and/or within typical background levels. The exception to this is the soil around CBS-41, which contained elevated heavy metal contamination, and the storm drain samples, which contained elevated lead concentrations.

However, the elevated metals at CBS-41 are not at the surface, reducing the possibility of impact to nearby human and terrestrial life. The storm drain sediments appear limited in extent and should not pose a significant risk of direct contact to biota. High rainfall events could promote washing of the sediments into the Tacoma storm drain system; however, impacts due to the detected levels of lead should be minimal when washed downstream with large volumes of water.

Although existing data does not indicate that the soil/sediments must be removed, cleanout of storm drain sediments is relatively easy to accomplish.

The solvent concentrations present in soil and groundwater near the former solvent shed appear to pose a minimal risk to human health and the environment. The area of contamination is small and appears to be primarily below the ground surface. This reduces the risk to both human and terrestrial life of exposure to organic contaminants at this location.

SECTION 3

CHARACTERIZATION AND DISPOSAL OF WASTE PRODUCTS

3.1 DRUM/CONTAINER SAMPLING/CHARACTERIZATION

In 1987, Kennedy/Jenks/Chilton and Crowley Environmental personnel performed a site reconnaissance of the site for drummed materials. The plant was divided into seven sections to organize the search. Each section was cleared of brush so that drums would not remain hidden. As drums were located, they were transported to the staging area. The staging area was located on a concrete pad near the former iron foundry building. Prior to placing drums in this area, the pad was covered by visqueen and a berm built up around the edges so that any spillage would be contained. Drums in poor condition were placed in overpack drums to reduce the chance of accidental spillage. A total of twenty-four drums were located.

After the drums were staged, Crowley personnel donned personal protective equipment for opening and sampling the drums. Liquids were sampled using dedicated glass rods and solids were sampled using dedicated plastic scoops/spoons. All samples were collected directly into clean glass jars. Observations regarding the visual characteristics of the material, quantity in the drum, labeling on the drum, etc., were noted at this time.

The individual samples were then characterized using pH, OVA, and the presence of water and chlorinated hydrocarbons. Based on these results, it was determined that all of the liquids should be compatible, except for one acid (pH of less than 1). A composite sample of the liquids was collected by removing approximately the same amount from each individual sample and collecting it in a jar while monitoring the temperature. After compositing the liquids, a small amount of the acid was added to a small amount of the composite in a separate jar to see if there would be a reaction. A large temperature increase showed that the acid should not be combined with the composite for disposal.

A composite of the solid materials was not collected, as it was necessary to dispose of the solids within industrial drums. The composite liquid sample, the acid, and the solids samples were then taken to a local laboratory under chain-of-custody procedures for the analyses required for acceptance by the disposal facility.

3.2 DISPOSAL OF DRUMMED/CONTAINERIZED MATERIAL

After receiving the results of the chemical analyses, the containerized wastes were scheduled for removal to an appropriate disposal facility.

In March, 1988, the removal of the drummed materials in the area of the former iron foundry began. Three drums of solidified black tar and one drum of acid were placed in overpacks by Crowley Environmental and transported to Chempro's Lucile Street facility under manifest number 07151 (copies of all manifests are included in Appendix D). The drums of liquid were opened and vacuumed into a small tank truck. The liquid drums were then triple-rinsed, with the rinsewaters also going into the tank truck. The liquids were taken to Chempro's Lucile Street facility under manifest number 07105.

Other drums of non-dangerous waste were removed to Chempro's Lucile Street facility under manifest number 07152.

SECTION 4

CONCLUSIONS AND RECOMMENDATIONS

CONCLUSIONS

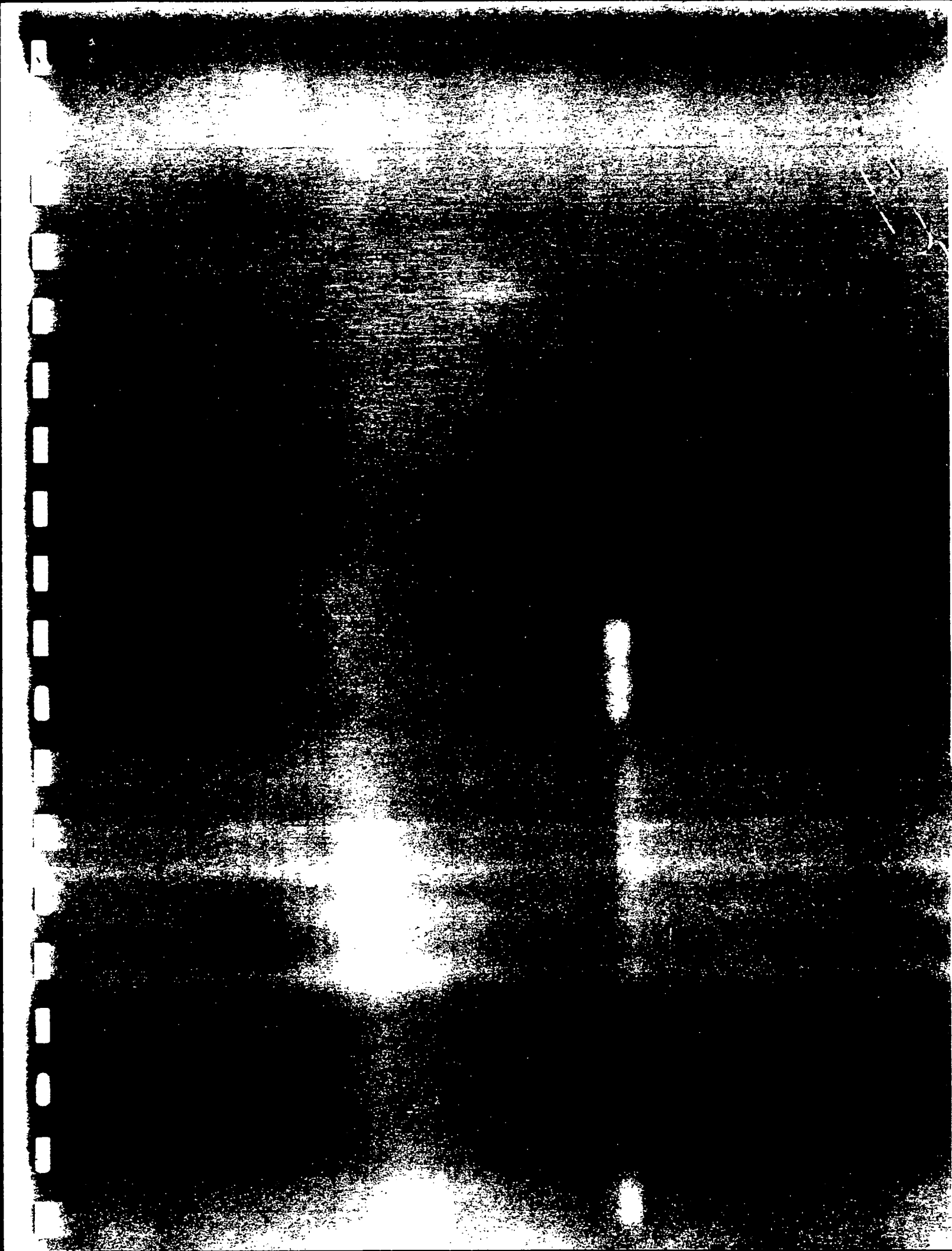
1. Based on available information, elevated metals concentrations are present at the former iron foundry plant site in two areas: shallow subsurface soil at CBS-41, and storm drain sediment. However, due to the suspected limited volume of soil with elevated levels of metals and since potential exposure to these metals appears limited, this soil appears to pose a minimal risk to the environment.
2. Based on available field data and available information regarding historical operations conducted onsite, the site appears to have had a minimal impact on overall groundwater quality in the South Tacoma Channel area.
3. Trace concentrations of four volatile organics (1,1,1-trichloroethane, tetrachloroethylene, xylenes, 1,1,2-trichloro-1,2,2-trifluoroethane) were found in shallow soil near the former solvent shed. All levels were below their EPCs, while levels of xylenes were above WDOE Final Cleanup Policy Standard/Background Cleanup levels but below the Protection Cleanup level.
4. Purgeable aromatic hydrocarbons were not detected in soil adjacent to an underground fuel tank.
5. PCBs were not detected in soil in the vicinity of a reported former transformer oil storage tank.
6. Trace concentrations of lead, below drinking water criteria, were detected in groundwater from the EPA wells. Trace concentrations of two volatile organics (trichlorofluoromethane, 1,1,1-trichloroethane), below applicable criteria, were detected in MW-5, near the former solvent shed.
7. Waste materials contained in drums and small containers, as well as building debris, have been removed from the site. A few additional drums of non-dangerous waste remain onsite.

RECOMMENDATIONS

1. Consider removal of visually stained soil from the area of the former solvent shed. Although concentrations of priority pollutants appear to pose a minimal risk to the environment, these soils appear to exceed background cleanup levels and oily soil cleanup guidelines of the Washington Department of Ecology. A

preliminary cost estimate range for removal, transportation, and disposal is \$5,000 to \$10,000, based on 75 yd³ of material and assuming the material can be disposed of in a construction debris landfill.

2. Evaluate the cost/benefit of removing the storm drain sediments versus leaving them onsite.



Figure

Kennedy/Jenks/Chilton

PROJECT		Tacoma Industrial Properties			DATE		11/12/87		BORING B-1
JOB NO		886738.00			BY		OL		
Details of Boring and Well Construction						SURFACE ELEVATION:			
SAMPLE NUMBER	SAMPLER TYPE	BLOWS/FT INTERVAL	Well Construction	DEPTH IN FEET	USCS	SYMBOLS	DRILLING METHODS: P-50 truck-mounted, hollow stem auger.		
							SAMPLING METHODS: Split barrel sampler.		
				-1			DRILLER: Rick Seiler (F.L.D.)		
				-2					
				-3					
				-4					
				-5			0' to 6½' Sandy gravel fill, stained dark 0' to approx. 5'. Clean below 5'.		
				-6					

Figure

Kennedy/Jenks/Chilton

PROJECT		Tacoma Industrial Properties			DATE		11/12/87		BORING B-2		
JOB NO		886738.00			BY		OL				
Details of Boring and Well Construction								SURFACE ELEVATION:			
SAMPLE NUMBER	SAMPLER TYPE	BLOWS/FT. INTERVAL	Well Construction			DEPTH IN FEET	USCS	SYMBOLS	DRILLING METHODS: P-50 truck-mounted, hollow stem auger.		
									SAMPLING METHODS: Split barrel sampler.		
									DRILLER: Rick Seiler (F.L.D.)		
1	DRIVE	30 for 12 "				-1 -2 -3 -4 -5 -6			@ 0' to 5' Sandy gravel fill, stained dark 0' to approx. 3'. Clean below 3'.		

Figure

Kennedy/Jenks/Chilton

PROJECT		Tacoma Industrial Properties			DATE		11/12/87		BORING B-3		
JOB NO		886738.00			BY		OL				
Details of Boring and Well Construction							SURFACE ELEVATION:				
SAMPLE NUMBER	SAMPLER TYPE	BLOWS/FT. INTERVAL	Well Construction	DEPTH IN FEET	USCS	SYMBOLS	DRILLING METHODS: P-50 truck-mounted, hollow stem auger.				
							SAMPLING METHODS: Split barrel sampler.				
							DRILLER: Rick Seiler (F.L.D.)				
				1			0' to 6' Sandy gravel fill, stained dark 0' to approx. 4'. Clean below 4'.				
				2							
				3							
				4							
				5							
				6							

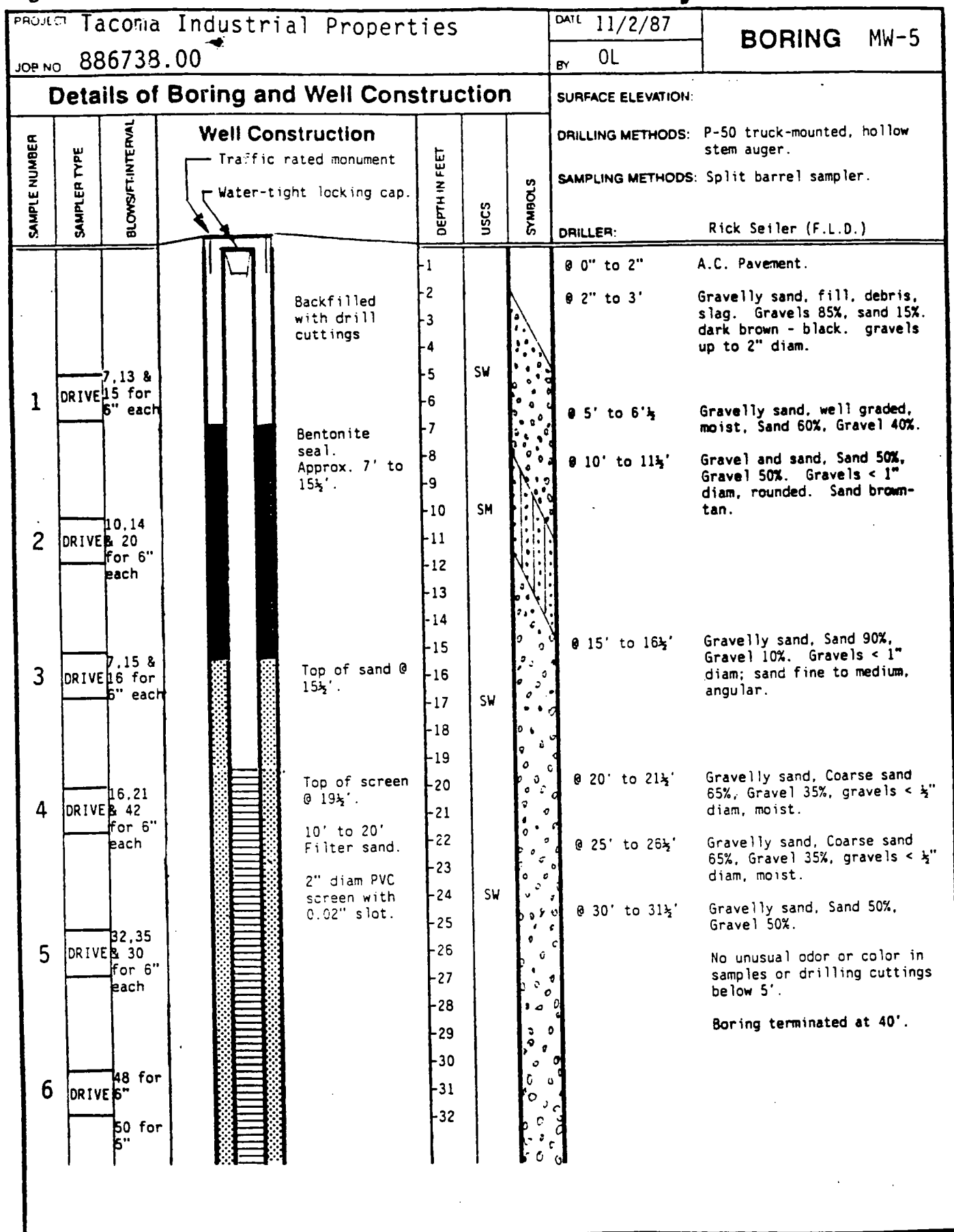
Figure

Kennedy/Jenks/Chilton

PROJECT		Tacoma Industrial Properties			DATE 11/12/87		BORING B-4	
JOB NO		886738.00			BY OL			
Details of Boring and Well Construction					SURFACE ELEVATION:			
SAMPLE NUMBER	SAMPLER TYPE	BLOWS/FT. INTERVAL	Well Construction	DEPTH IN FEET	USCS	SYMBOLS	DRILLING METHODS: P-50 truck-mounted hollow stem auger.	
							SAMPLING METHODS: Split barrel sampler.	
							DRILLER: Rick Seiler (F.L.D.)	
1	DRIVE	7, 10 & 13 for 6" each		-1	SM		@ 0" to 2" A.C. Pavement.	
				-2			@ 2" to 10 1/2" Sand, fine brown to grey, moist, gravel < 5%.	
2	DRIVE	10, 13 & 15 for 6" each		-3			Boring terminated at 10 1/2'	
				-4			No product odor or unusual color in samples or cuttings.	
				-5			Probed adjacent fuel tank bottom @ 8'; tank contains approx. 3 3/4" liquid. Odor-gasoline.	
				-6				
				-7				
				-8				
				-9				
				-10				
				-11				
				-12				

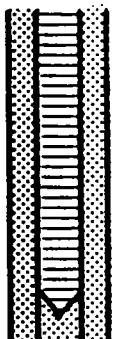

Figure

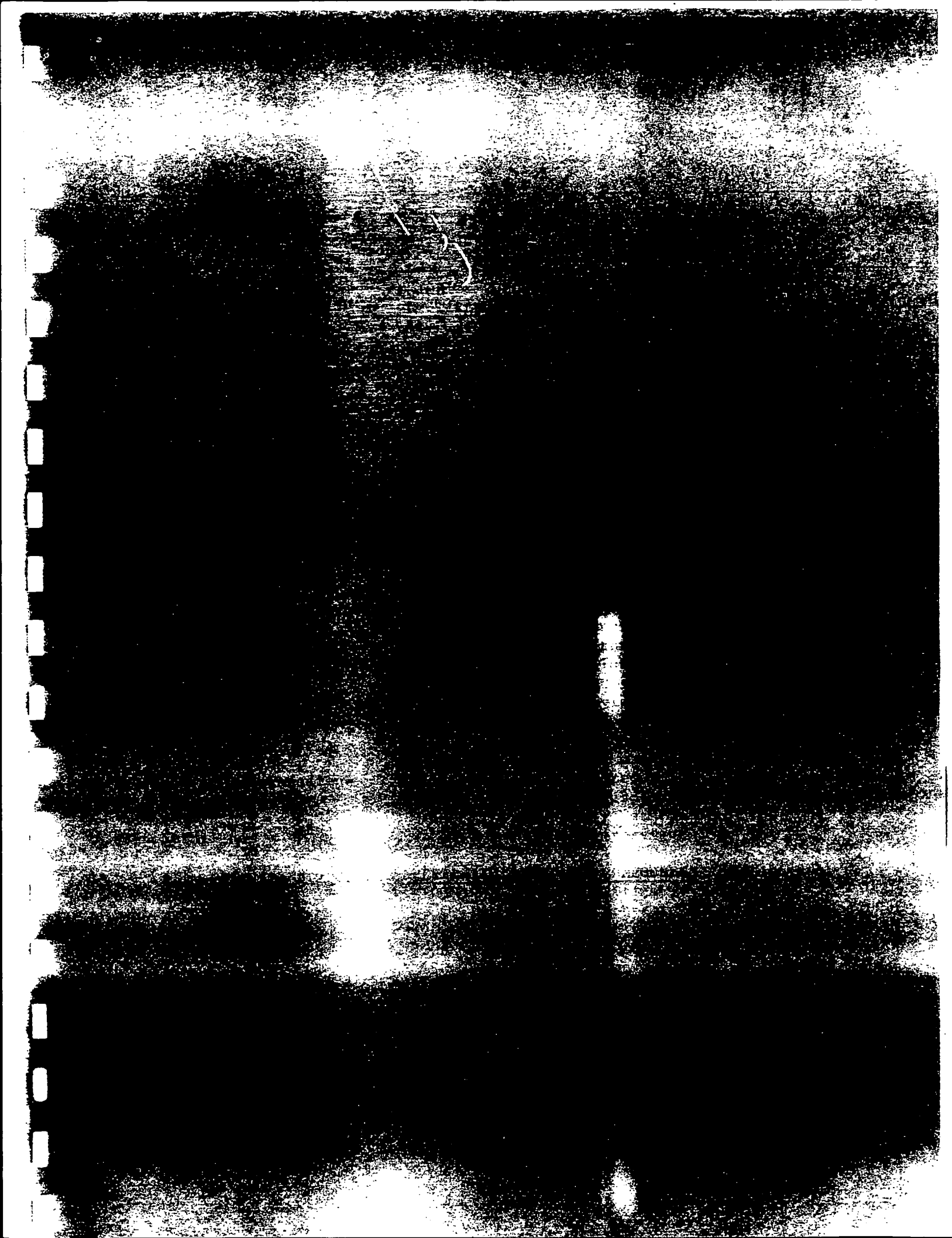
Kennedy/Jenks/Chilton



Figure

Kennedy/Jenks/Chilton

PROJECT		Tacoma Industrial Properties			DATE		11/2/87		BORING MW-5		
JOB NO		886738.00			BY		OL				
Details of Boring and Well Construction							SURFACE ELEVATION:				
SAMPLE NUMBER	SAMPLER TYPE	BLOWS/FT. INTERVAL	Well Construction	DEPTH IN FEET	USCS	SYMBOLS	DRILLING METHODS:				
							SAMPLING METHODS:				
							DRILLER: Rick Seiler (F.L.D.)				
			 <p>Bottom of screen @ 39½'.</p> <p>End cap.</p>	33 34 35 36 37 38 39 40	SW						



APPENDIX B

CALCULATION OF ESTIMATED PERMISSIBLE
CONCENTRATION AND MAXIMUM ACCEPTABLE WATER CONCENTRATIONS
FOR COMPOUNDS AT FORMER IRON FOUNDRY SITE

EPCs: EPA has not established a multimedia environmental goal for 1,1,2-Trichloro-1,2,2-trifluoroethane. The development of the suggested action level for this compounds in soil and groundwater presented below follows EPA formulas for calculating estimated permissible concentrations (EPC)^a:

Health Effects in Water (WH2)^c

$$WH2(ug/L) = 13.8 \times TLV(mg/m^3)$$

Health Effects on Land (LH)^c

$$LH(mg/Kg) = 200 \times WH2(mg/L)$$

Example:

The Threshold Limit Value (TLV) for 1,1,2-Trichloro-1,2,2-trifluoroethane is 7600 mg/m³ ^b. The calculation of WH2 and LH is therefore:

$$WH2 = 13.8 \times 7600 = 104,880 \text{ ug/l}$$

$$LH = 200 \times 104,880 \times \frac{1}{1000} = 20,976 \text{ mg/Kg}$$

Our suggested soil action level is set at 20,976 mg/Kg. Our suggested water action level is set at 104,880 mg/l.

Notes:

^a EPA, 1980. "Multimedia Environmental Goals for Environmental Assessment," Volume I (Supplement A). EPA 600/7-80-041.

^b TLVs, Threshold Limit Values for Chemical Substances and Physical Agents in the Work Environment with Intended Changes for 1986-87. American Conference of Governmental Industrial Hygienists, 1986.

^c WH2 - Health Effects in Water

LH - Health Effects on Land

TLV - Threshold Limit Value

Nomenclature used by EPA in note a

MAWCs: EPA has developed a methodology for calculating maximum acceptable concentrations in a media for carcinogenic or suspected carcinogenic compounds. These concentrations are based on the potency slope developed by EPA's Carcinogen Assessment Group (CAG) and the selected risk level. EPA typically uses risks on the order of 10^{-4} to 10^{-7} when selecting an acceptable risk level.

To calculate the maximum acceptable water concentrations (MAWC), the acceptable dose (AD) must first be calculated using the following equation:

$$AD \text{ (mg/kg/day)} = \text{Risk Level/Potency Slope}$$

To assess the AD for a typical 70 kg adult, the AD was multiplied by 70 kg, resulting in an AD in mg/day. The MAWC was then calculated by the following equation:

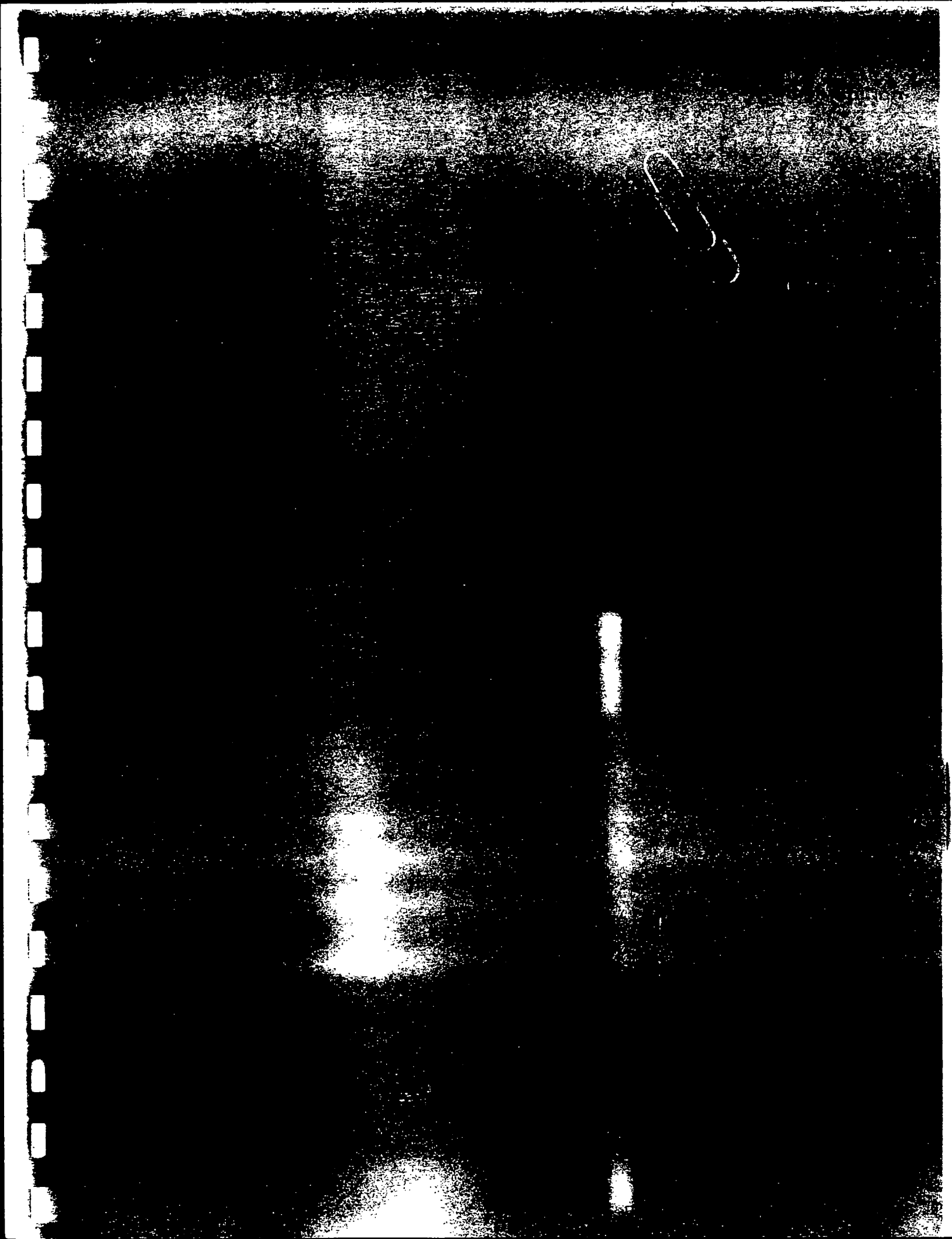
$$MAWC \text{ (mg/l)} = AD \text{ (mg/day)}/\text{Water Ingestion Rate (l/day)}$$

EPA has used two liters per day as the average daily water intake of a human adult.^a

MAWCs were calculated for tetrachloroethylene. The potency slope for tetrachloroethylene is 5.1×10^{-2} mg/kg/day.^b Calculating the MAWC for a risk level of 10^{-5} led to a concentration of 0.07 mg/l for tetrachloroethylene.

Notes:

- a EPA, 1985. "EPA Proposal to Set Recommended Drinking Water Limits for Inorganic, Synthetic Organic Chemicals, Microorganisms." 50 FR 46936, November 13, 1985.
- b EPA, 1985. Office of Health and Environmental Assessment. "Health Assessment Document for Tetrachloroethylene (Perchloroethylene)," Washington, D.C.



GC/MS Priority Pollutant Analysis

Kennedy/Jenks/Chilton, Laboratory Division

657 Howard Street
San Francisco, CA 94105
415-362-6065For Kennedy/Jenks/Chilton
Attention Mr. Nathan Graves
Address 33301 Ninth Avenue South, Suite 100
Federal Way, WA 98003Received 10/7/86
Reported 11/3/86
(K/J/C 6738)

Lab. No. 866000

Source Soil, GS-2
TIP
Tacoma, WA
Date Collected 10/2/86

Time Collected -

Collected by K/J/C

Sample Type: Soil, GS-2

PRIORITY POLLUTANT COMPOUNDS

Volatiles	ug/kg(ppb)	Volatiles	ug/kg(ppb)
chloromethane	<100	1,2-dichloropropane	<100
bromomethane	<100	trans-1,3-dichloropropylene	<100
vinyl chloride	<100	trichloroethylene	<100
chloroethane	<100	benzene	<100
methylene chloride	(1)	dibromochloromethane	<100
trichlorofluoromethane	<100	cis-1,3-dichloropropylene	<100
1,1-dichloroethylene	<100	1,1,2-trichloroethane	<100
1,1-dichloroethane	<100	2-chloroethylvinyl ether	<100
1,2-dichloroethylene	<100	bromoform	<100
chloroform	(1)	tetrachloroethylene	300
1,2-dichloroethane	<100	1,1,2,2-tetrachloroethane	<100
1,1,1-trichloroethane	550	toluene	<100
carbon tetrachloride	<100	chlorobenzene	<100
bromodichloromethane	<100	ethylbenzene	<100

NON-PRIORITY POLLUTANT COMPOUNDS

acetone	<1000	vinyl acetate	<100
carbon disulfide	<100	4-methyl-2-pentanone	<1000
1,1,2-Trichloro-		2-hexanone	<1000
1,2,2-trifluoroethane	<100	styrene	<100
methyl ethyl ketone	<2000	xylenes	5000

Comments: (1) This component was not quantifiable in this sample.

Analysis by U.S. EPA Method 8240, reported in micrograms per kilogram, wet (as received) weight basis.

Analyst EW, BK

Manager

Leveneth R. Smith

This report applies only to the sample investigated and is not necessarily indicative of the quality of apparently identical or similar samples. The liability of the laboratory is limited to the amount paid for the report by the issuee. The issuee assumes all liability for the further distribution of this report or its contents and by making such distribution agrees to hold the laboratory harmless against all claims of persons so informed of the contents hereof.

GC/MS Priority Pollutant Analysis

Kennedy/Jenks/Chilton, Laboratory Division

657 Howard Street
San Francisco, CA 94105
415-362-6065For Kennedy/Jenks/Chilton
Attention Mr. Nathan Graves
Address 33301 Ninth Avenue South, Suite 100
Federal Way, WA 98003Received 10/7/86
Reported 12/3/86
(K/J/C 6738)

Lab.No. 866000 Date Collected 10/2/86 Collected by K/J/C.

Source TIP, Tacoma, WA Time Collected - Sample Type: GS-2

PRIORITY POLLUTANT COMPOUNDS			
COMPOUNDS	ug/kg (ppb)	COMPOUNDS	ug/kg (ppb)
phenol	<200	2,6-dinitrotoluene	<200
2-chlorophenol	<200	acenaphthene	<200
2-nitrophenol	<200	2,4-dinitrotoluene	<200
2,4-dimethylphenol	<200	fluorene	<200
2,4-dichlorophenol	<200	diethyl phthalate	<200
4-chloro-3-methylphenol	<200	4-chlorophenylphenyl ether	<200
2,4,6-trichlorophenol	<200	N-nitrosodiphenylamine	<200
2,4-dinitrophenol	<1000	1,2-diphenylhydrazine (azobenzene)	<200
2-methyl-4,6-dinitrophenol	<1000	4-bromophenylphenyl ether	<200
4-nitrophenol	<200	hexachlorobenzene	<200
pentachlorophenol	<200	phenanthrene	<200
bis(2-chloroethyl)ether	<200	anthracene	<200
1,3-dichlorobenzene	<200	di-n-butyl phthalate	<200
1,4-dichlorobenzene	<200	fluoranthene	<200
1,2-dichlorobenzene	<200	benzidine	<1000
bis(2-chloroisopropyl)ether	<200	pyrene	<200
hexachloroethane	<200	benzyl butyl phthalate	<200
N-nitrosodi-n-propylamine	<200	benz[a]anthracene	<200
nitrobenzene	<200	3,3'-dichlorobenzidine	<400
isophorone	<200	chrysene	<200
bis(2-chloroethoxy) methane	<200	bis(2-ethylhexyl)phthalate	<200
1,2,4-trichlorobenzene	<200	di-n-octyl phthalate	<200
naphthalene	<200	benzo[b]fluoranthene	<200
hexachlorobutadiene	<200	benzo[k]fluoranthene	<200
hexachlorocyclopentadiene	<200	benzo[a]pyrene	<200
2-chloronaphthalene	<200	indeno[1,2,3-cd]pyrene	<200
dimethyl phthalate	<200	dibenz[a,h]anthracene	<200
acenaphthylene	<200	benzo[ghi]perylene	<200

NON-PRIORITY POLLUTANT COMPOUNDS

benzoic acid	<1000	4-chloroaniline	<1000
2-methylphenol	<200	2-methylnaphthalene	<200
4-methylphenol	<200	2-nitroaniline	<1000
2,4,5-trichlorophenol	<200	3-nitroaniline	<1000
aniline	<200	dibenzofuran	<200
benzyl alcohol	<400	4-nitroaniline	<1000

Analysis by U.S. EPA Method 8270, reported in micrograms per kilogram, wet (as received) weight basis.

Note: Extract was oily, requiring dilution before analysis.

Analyst BK

Manager

Lawrence R. Smith

This report applies only to the sample investigated and is not necessarily indicative of the quality of apparently identical or similar samples. The liability of the laboratory is limited to the amount paid for the report by the issuee. The issuee assumes all liability for the further distribution of this report or its contents and by making such distribution agrees to hold the laboratory harmless against all claims of persons so informed of the contents hereof.

GC/MS Volatiles
Surrogate Standard Recovery Report

Kennedy/Jenks/Chilton

Laboratory Division
657 Howard Street
San Francisco, California 94105
415-362-6065

For Kennedy/Jenks/Chilton
Attention Mr. Nathan Graves
Address 33301 Ninth Avenue South, Suite 100
Federal Way, WA 98003

Received 10/9/86
Reported 11/3/86

(K/J/C 6738)

<u>Sample Identification</u>		<u>Percent Recoveries</u>		
<u>Lab No.</u>	<u>Type</u>	<u>1,2-Dichloroethane-d4</u>	<u>Fluorobenzene</u>	<u>4-Bromofluorobenzene</u>
865999	Soil	104	78	124
866000	Soil	109	78	51

Analyst BK

Manager Loreneth R. Smith

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GC/MS Priority Pollutant Analysis

Kennedy/Jenks/Chilton, Laboratory Division

657 Howard Street

San Francisco, CA 94105

415-362-6065

For Kennedy/Jenks/Chilton
 Attention Mr. Nathan Graves
 Address 33301 Ninth Avenue South, Suite 100
 Federal Way, WA 98003

Received 10/7/86
 Reported 12/3/86
 (K/J/C 6738)

Lab.No. 866001 Date Collected 10/2/86 Collected by K/J/C.
 Source TIP, Tacoma, WA Time Collected 1241 Sample Type: SS-4

PRIORITY POLLUTANT COMPOUNDS			
COMPOUNDS	ug/kg(ppb)	COMPOUNDS	ug/kg(ppb)
phenol	<2000	2,6-dinitrotoluene	<2000
2-chlorophenol	<2000	acenaphthene	<2000
2-nitrophenol	<2000	2,4-dinitrotoluene	<2000
2,4-dimethylphenol	<2000	fluorene	<2000
2,4-dichlorophenol	<2000	diethyl phthalate	<2000
4-chloro-3-methylphenol	<2000	4-chlorophenylphenyl ether	<2000
2,4,6-trichlorophenol	<2000	N-nitrosodiphenylamine	<2000
2,4-dinitrophenol	<10,000	1,2-diphenylhydrazine (azobenzene)	<2000
2-methyl-4,6-dinitrophenol	<10,000	4-bromophenylphenyl ether	<2000
4-nitrophenol	<2000	hexachlorobenzene	<2000
pentachlorophenol	<2000	phenanthrene	<2000
bis(2-chloroethyl)ether	<2000	anthracene	<2000
1,3-dichlorobenzene	<2000	di-n-butyl phthalate	<2000
1,4-dichlorobenzene	<2000	fluoranthene	<2000
1,2-dichlorobenzene	<2000	benzidine	<10,000
bis(2-chloroisopropyl)ether	<2000	pyrene	<2000
hexachloroethane	<2000	benzyl butyl phthalate	<2000
N-nitrosodi-n-propylamine	<2000	benz[a]anthracene	<2000
nitrobenzene	<2000	3,3'-dichlorobenzidine	<4000
isophorone	<2000	chrysene	<2000
bis(2-chloroethoxy) methane	<2000	bis(2-ethylhexyl)phthalate	<2000
1,2,4-trichlorobenzene	<2000	di-n-octyl phthalate	<2000
naphthalene	<2000	benzo[b]fluoranthene	<2000
hexachlorobutadiene	<2000	benzo[k]fluoranthene	<2000
hexachlorocyclopentadiene	<2000	benzo[a]pyrene	<2000
2-chloronaphthalene	<2000	indeno[1,2,3-cd]pyrene	<2000
dimethyl phthalate	<2000	dibenz[a,h]anthracene	<2000
acenaphthylene	<2000	benzo[ghi]perylene	<2000
NON-PRIORITY POLLUTANT COMPOUNDS			
benzoic acid	<10,000	4-chloroaniline	<10,000
2-methylphenol	<2000	2-methylnaphthalene	<2000
4-methylphenol	<2000	2-nitroaniline	<10,000
2,4,5-trichlorophenol	<2000	3-nitroaniline	<10,000
aniline	<2000	dibenzofuran	<2000
benzyl alcohol	<4000	4-nitroaniline	<10,000

Analysis by U.S. EPA Method 8270, reported in micrograms per kilogram, wet (as received) weight basis.

Note: Extract was oily, requiring dilution before analysis.

Analyst BK

Manager

Laurett R. Smith

This report applies only to the sample investigated and is not necessarily indicative of the quality of apparently identical or similar samples. The liability of the laboratory is limited to the amount paid for the report by the issuee. The issuee assumes all liability for the further distribution of this report or its contents and by making such distribution agrees to hold the laboratory harmless against all claims of persons so informed of the contents hereof.

Soil Analysis Report

Kennedy/Jenks/Chilton

Laboratory Division
657 Howard Street
San Francisco, California 94105
415 362 6065

For Kennedy/Jenks/Chilton
Attention Nathan Graves
Address 33301 Ninth Avenue South, Suite 100
Federal Way, WA 98003

Received 10/23/86
Reported 12/3/86

(K/J/C 6738)

Lab. No. 867367

Source Soil I.D.: SS-6
TIP
Tacoma, WA

Date Collected 10/17/86

Time Collected 1450

Collected by K/J/C

Analysis (1)	Units	Analytical Results
Polychlorinated biphenyls (PCBs)	mg/Kg	<1

Comments: (1) Analysis by EPA Method 8080; reported in milligrams per kilogram, wet (as received) weight basis. Extraction by EPA Method 3540 (Soxhlet). Reported as Aroclor 3540.

Reference: "Test Methods for Evaluating Solid Waste - Physical/Chemical Methods", SW-846, Second Edition (Revised 1984), and "California Administrative Code Title 22, Div. 4".

Analyst MC

Manager *Leverett R. Smith*

This report applies only to the sample investigated and is not necessarily indicative of the quality of apparently identical or similar samples. The liability of the laboratory is limited to the amount paid for the report by the issuee. The issuee assumes all liability for the further distribution of this report or its contents and by making such distribution agrees to hold the laboratory harmless against all claims of persons so informed of the contents hereof.

Soil Analysis Report

Kennedy/Jenks/Chilton

Laboratory Division
657 Howard Street
San Francisco, California 94105
415-362-6065

For Kennedy/Jenks/Chilton
Attention Owen Loshbough
Address 33301 Ninth Avenue South, Suite 100
Federal Way, WA 98003

Received 10/23/86
Reported 10/31/86

(K/J/C 6733)

Lab. No. 867370

Source Soil I.D.: SD-1
TIP
Tacoma, WA

Date Collected 10/9/86

Time Collected 1608

Collected by K/J/C

Analysis	Units	Analytical Results
Lead (Pb) (2)	mg/Kg (1)	320

Comments: (1) Milligrams per kilogram, wet (as received) weight basis.
(2) Analysis by atomic absorption spectrophotometer.

Reference: "Test Methods for Evaluating Solid Waste - Physical/Chemical Methods", SW-846, Second Edition (Revised 1984), and
"California Administrative Code Title 22, Div. 4".

Analyst AD

Manager

Levenett R. Smith

cc: Nathan Graves, K/J/C, Federal Way, WA

This report applies only to the sample investigated and is not necessarily indicative of the quality of apparently identical or similar samples. The liability of the laboratory is limited to the amount paid for the report by the issuee. The issuee assumes all liability for the further distribution of this report or its contents and by making such distribution agrees to hold the laboratory harmless against all claims of persons so informed of the contents hereof.

Water Analysis Report

Kennedy/Jenks/Chilton

Laboratory Division
657 Howard Street
San Francisco, California 94105
415-362-6065

For Kennedy/Jenks/Chilton
Attention Owen Loshbough
Address 33301 Ninth Avenue South, Suite 100
Federal Way, WA 98003

Received 10/23/86
Reported 10/31/86
(K/J/C 6733)

Lab. No. 867371

Source Water I.D.: SD-2
TIP
Tacoma, WA

Date Collected 10/9/86

Time Collected 1616

Collected by K/J/C

Analysis	Units	Analytical Results
Lead (Pb)	mg/L	9.0

Comments:

Analysis by: "Standard Methods for the Examination of Water and Wastewater", Current Edition APHA.

Analyst AD Manager *Levett R. Smith*
cc: Nathan Graves, K/J/C, Federal Way, WA

This report applies only to the sample investigated and is not necessarily indicative of the quality of apparently identical or similar samples. The liability of the laboratory is limited to the amount paid for the report by the issuee. The issuee assumes all liability for the further distribution of this report or its contents and by making such distribution agrees to hold the laboratory harmless against all claims of persons so informed of the contents hereof.

Soil Analysis Report

Kennedy/Jenks/Chilton

Laboratory Division

657 Howard Street
San Francisco, California 94105
415-362-6065

For Kennedy/Jenks/Chilton
Attention Owen Loshbough
Address 33301 Ninth Avenue South, Suite 100
Federal Way, WA 98003

Received 10/23/86
Reported 10/31/86

(K/J/C 6733)

Lab. No. 867368

Source Soil I.D.: SD-3
TIP
Tacoma, WA

Date Collected 10/10/86

Time Collected 1027

Collected by K/J/C

Analysis	Units	Analytical Results
Lead (Pb) (2)	mg/Kg (1)	530

Comments: (1) Milligrams per kilogram, wet (as received) weight basis.
(2) Analysis by atomic absorption spectrophotometer.

Reference: "Test Methods for Evaluating Solid Waste - Physical/Chemical Methods", SW-846, Second Edition (Revised 1984), and
"California Administrative Code Title 22, Div. 4".

Analyst AD

Manager

Levett R. Smith

cc: Nathan Graves, K/J/C, Federal Way, WA

This report applies only to the sample investigated and is not necessarily indicative of the quality of apparently identical or similar samples. The liability of the laboratory is limited to the amount paid for the report by the issuee. The issuee assumes all liability for the further distribution of this report or its contents and by making such distribution agrees to hold the laboratory harmless against all claims of persons so informed of the contents hereof.

Soil Analysis Report

Kennedy/Jenks/Chilton

Laboratory Division
657 Howard Street
San Francisco, California 94105
415-362-6065

For Kennedy/Jenks/Chilton
Attention Nathan Graves
Address 33301 Ninth Avenue South, Suite 100
Federal Way, WA 98003

Received 10/23/86
Reported 12/3/86

(K/J/C 6738)

Lab. No. 867368

Source Soil I.D.: SD-3
TIP
Tacoma, WA

Date Collected 10/10/86

Time Collected 1021

Collected by K/J/C

Analysis	Units	Analytical Results
Petroleum Hydrocarbons (as diesel fuel)	mg/Kg	8.5

Comments: Analysis of pentane extract by gas chromatography with flame ionization detection, using commercial hydrocarbon samples as comparison standards. Results reported in milligrams per kilogram, wet (as received) weight basis.

Reference: "Test Methods for Evaluating Solid Waste - Physical/Chemical Methods", SW-846, Second Edition (Revised 1984), and:
"California Administrative Code Title 22, Div. 4".

Analyst KA

Manager

Leverett R. Smith

This report applies only to the sample investigated and is not necessarily indicative of the quality of apparently identical or similar samples. The liability of the laboratory is limited to the amount paid for the report by the issuee. The issuee assumes all liability for the further distribution of this report or its contents and by making such distribution agrees to hold the laboratory harmless against all claims of persons so informed of the contents hereof.

Soil Analysis Report

Kennedy/Jenks/Chilton

Laboratory Division
657 Howard Street
San Francisco, California 94105
415-362-6065

For Kennedy/Jenks/Chilton
Attention Owen Loshbough
Address 33301 Ninth Avenue South, Suite 100
Federal Way, WA 98003

Received 10/23/86
Reported 10/31/86

(K/J/C 6733)

Lab. No. 867372

Source Soil I.D.: SD-4
TIP
Tacoma, WA

Date Collected 10/9/86

Time Collected 1633

Collected by K/J/C

Analysis	Units	Analytical Results
Lead (Pb) (2)	mg/Kg (1)	96

Comments: (1) Milligrams per kilogram, wet (as received) weight basis.
(2) Analysis by atomic absorption spectrophotometer.

Reference: "Test Methods for Evaluating Solid Waste - Physical/Chemical Methods", SW-846, Second Edition (Revised 1984), and
"California Administrative Code Title 22, Div. 4".

Analyst AD

Manager

Everett R. Smith

cc: Nathan Graves, K/J/C, Federal Way, WA

This report applies only to the sample investigated and is not necessarily indicative of the quality of apparently identical or similar samples. The liability of the laboratory is limited to the amount paid for the report by the issuee. The issuee assumes all liability for the further distribution of this report or its contents and by making such distribution agrees to hold the laboratory harmless against all claims of persons so informed of the contents hereof.

Water Analysis Report

Kennedy/Jenks/Chilton

Laboratory Division
657 Howard Street
San Francisco, California 94105
415-362-6065

For Kennedy/Jenks/Chilton
Attention Owen Loshbough
Address 33301 Ninth Avenue South, Suite 100
Federal Way, WA 98003

Received 10/23/86
Reported 10/31/86
(K/J/C 6733)

Lab. No. 867373

Source Water I.D.: SD-5
TIP
Tacoma, WA

Date Collected 10/9/86

Time Collected 1640

Collected by K/J/C

Analysis	Units	Analytical Results
Lead (Pb)	mg/L	1.6

Comments:

Analysis by: "Standard Methods for the Examination of Water and Wastewater", Current Edition, APHA.

AD

Analyst cc: Nathan Graves, K/J/C, Federal Way, WA Manager

Leverett R. Smith

This report applies only to the sample investigated and is not necessarily indicative of the quality of apparently identical or similar samples. The liability of the laboratory is limited to the amount paid for the report by the issuee. The issuee assumes all liability for the further distribution of this report or its contents and by making such distribution agrees to hold the laboratory harmless against all claims of persons so informed of the contents hereof.

Soil Analysis Report

Kennedy/Jenks/Chilton

Laboratory Division
657 Howard Street
San Francisco, California 94105
415-362-6065

For Kennedy/Jenks/Chilton
Attention Owen Loshbough
Address 33301 Ninth Avenue South, Suite 100
Federal Way, WA 98003

Received 10/23/86
Reported 10/31/86

(K/J/C 6733)

Lab. No. 867374

Source Soil I.D.: SD-6
TIP
Tacoma, WA

Date Collected 10/9/86

Time Collected 1651

Collected by K/J/C

Analysis	Units	Analytical Results
Lead (Pb) (2)	mg/Kg (1) 1200	

Comments: (1) Milligrams per kilogram, wet (as received) weight basis.
(2) Analysis by atomic absorption spectrophotometer.

Reference: "Test Methods for Evaluating Solid Waste - Physical/Chemical Methods", SW-846, Second Edition (Revised 1984), and
"California Administrative Code Title 22, Div. 4".

Analyst AD

Manager

Leverett R. Smith

cc: Nathan Graves, K/J/C, Federal Way, WA

This report applies only to the sample investigated and is not necessarily indicative of the quality of apparently identical or similar samples. The liability of the laboratory is limited to the amount paid for the report by the issuee. The issuee assumes all liability for the further distribution of this report or its contents and by making such distribution agrees to hold the laboratory harmless against all claims of persons so informed of the contents hereof.

EP Toxicity Analysis Report**Kennedy/Jenks/Chilton**Laboratory Division
657 Howard Street
San Francisco, California 94105
415-362-6065For Kennedy/Jenks/Chilton
Attention Mr. Nathan Graves
Address 33301 Ninth Avenue South, Suite 100
Federal Way, WA 98003Received 10/23/86
Reported 12/3/86
(K/J/C 6738)

Lab. No. 867374Source SD-6
TIP
Tacoma, WA

Date Collected 10/9/86

Time Collected 1651

Collected by K/J/C

Contaminant	Units	Concentration in Extract (1)
Lead (Pb)	mg/L	<0.5

Final pH of extract = 5.2

Comments:Reference: "Test Methods for Evaluating Solid Waste - Physical/Chemical Methods,"
SW-846, Second Edition, 1984, U.S. EPA.

Analyst TK, AD

Manager

Leverett R. Smith

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Soil Analysis Report

Kennedy/Jenks/Chilton

Laboratory Division
657 Howard Street
San Francisco, California 94105
415-362-6065

For Kennedy/Jenks/Chilton
Attention Owen Loshbough
Address 33301 Ninth Avenue South, Suite 100
Federal Way, WA 98003

Received 10/23/86
Reported 10/31/86

(K/J/C 6733)

Lab. No. 867369

Source Soil I.D.: SD-7
TIP
Tacoma, WA

Date Collected 10/9/86

Time Collected 1701

Collected by K/J/C

Analytical Results

Analysis	Units	Analytical Results
----------	-------	--------------------

Lead (Pb) (2)	mg/Kg (1)	310
---------------	-----------	-----

Comments: (1) Milligrams per kilogram, wet (as received) weight basis.
(2) Analysis by atomic absorption spectrophotometer.

Reference: "Test Methods for Evaluating Solid Waste - Physical/Chemical Methods", SW-846, Second Edition (Revised 1984), and
"California Administrative Code Title 22, Div. 4".

Analyst AD

Manager

Leverett R. Smith

cc: Nathan Graves, K/J/C, Federal Way, WA

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Soil Analysis Report

Kennedy/Jenks/Chilton

Laboratory Division

657 Howard Street
San Francisco, California 94105
415-362 6055

For Kennedy/Jenks/Chilton
Attention Nathan Graves
Address 33301 Ninth Avenue South, Suite 100
Federal Way, WA 98003

Received 10/23/86
Reported 12/3/86

(K/J/C 6738)

Lab. No. 867369

Source Soil I.D.: SD-7
TIP
Tacoma, WA

Date Collected 10/9/86

Time Collected 1701

Collected by K/J/C

Analysis	Units	Analytical Results
Petroleum Hydrocarbons (kerosene)	mg/Kg	61

Comments: Analysis of pentane extract by gas chromatography with flame ionization detection, using commercial hydrocarbon samples as comparison standards. Results reported in milligrams per kilogram, wet (as received) weight basis.

Reference: "Test Methods for Evaluating Solid Waste - Physical/Chemical Methods", SW-846, Second Edition (Revised 1984), and "California Administrative Code Title 22, Div. 4".

Analyst KA

Manager

Leverett R. Smith

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GC/MS Priority Pollutant Analysis

Kennedy/Jenks/Chilton, Laboratory Division

657 Howard Street
San Francisco, CA 94105
415-362-6065For Kennedy/Jenks/Chilton
Attention Owen Loshbough
Address 33301 Ninth Avenue South, Suite 100
Federal Way, WA 98003Received 11/17/87
Reported 11/30/87
(K/J/C 866738.00)

Lab. No. 877719

Source TIP

Date Collected 11/12/87

Time Collected 1352 Date Analyzed: 11/24/87

Collected by K/J/C

Sample Type: Soil: B-2, Depth 5-6.5 ft

PRIORITY POLLUTANT COMPOUNDS

Volatiles	ug/Kg(ppb)		Volatiles	ug/Kg(ppb)	
	Det. Lim.			Det. Lim.	
chloromethane	<10	10	bromodichloromethane	<5	5
bromomethane	<10	10	1,2-dichloropropane	<5	5
vinyl chloride	<10	10	trans-1,3-dichloropropylene	<5	5
chloroethane	<10	10	trichloroethylene	<5	5
methylene chloride	<20	20	benzene	<5	5
acrolein	<30	30	dibromochloromethane	<5	5
acrylonitrile	<10	10	cis-1,3-dichloropropylene	<5	5
trichlorofluoromethane	<5	5	1,1,2-trichloroethane	<5	5
1,1-dichloroethylene	<5	5	2-chloroethylvinyl ether	<5	5
1,1-dichloroethane	<5	5	bromoform	<5	5
1,2-dichloroethylene	<5	5	tetrachloroethylene	<5	5
Chloroform	<5	5	1,1,2,2-tetrachloroethane	<5	5
1,2-dichloroethane	<5	5	toluene	<5	5
1,1,1-trichloroethane	<5	5	chlorobenzene	<5	5
carbon tetrachloride	<5	5	ethylbenzene	<5	5

NON-PRIORITY POLLUTANT COMPOUNDS

acetonitrile	<30	30	vinyl acetate	<10	10
acetone	<10	10	4-methyl-2-pentanone	<10	10
carbon disulfide	<5	5	2-hexanone	<10	10
1,1,2-Trichloro-			styrene	<5	5
1,2,2-trifluoroethane	7	5	xylenes	<5	5
methyl ethyl ketone	<10	10			

Comments: Analysis by U.S. EPA Method 8240, reported in micrograms per kilogram, wet (as received) weight basis.

Analyst TJL, SL

Manager

Levett R. Smith

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GC/MS Priority Pollutant Analysis

Kennedy/Jenks/Chilton, Laboratory Division

657 Howard Street

San Francisco, CA 94105

415-362-6065

For Kennedy/Jenks/Chilton
 Attention Owen Loshbough
 Address 33301 Ninth Avenue South, Suite 100
 Federal Way, WA 98003

Received -
 Reported 11/30/87
 (K/J/C 866738.00)

Lab. No. Method Blank

Source -

Date Collected -

Time Collected -

Date Analyzed: 11/24/87

Collected by K/J/C

Sample Type: Water: -

PRIORITY POLLUTANT COMPOUNDS

Volatiles	ug/L (ppb)		Volatiles	ug/L (ppb)	
	Det. Lim.			Det. Lim.	
chloromethane	<10	10	bromodichloromethane	<5	5
bromomethane	<10	10	1,2-dichloropropane	<5	5
vinyl chloride	<10	10	trans-1,3-dichloropropylene	<5	5
chloroethane	<10	10	trichloroethylene	<5	5
methylene chloride	7	5	benzene	<5	5
acrolein	<30	30	dibromochloromethane	<5	5
acrylonitrile	<10	10	cis-1,3-dichloropropylene	<5	5
trichlorofluoromethane	<5	5	1,1,2-trichloroethane	<5	5
1,1-dichloroethylene	<5	5	2-chloroethylvinyl ether	<5	5
1,1-dichloroethane	<5	5	bromoform	<5	5
1,2-dichloroethylene	<5	5	tetrachloroethylene	<5	5
Chloroform	<5	5	1,1,2,2-tetrachloroethane	<5	5
1,2-dichloroethane	<5	5	toluene	<5	5
1,1,1-trichloroethane	<5	5	chlorobenzene	<5	5
carbon tetrachloride	<5	5	ethylbenzene	<5	5

NON-PRIORITY POLLUTANT COMPOUNDS

acetonitrile	<30	30	vinyl acetate	<10	10
acetone	<10	10	4-methyl-2-pentanone	<10	10
carbon disulfide	<5	5	2-hexanone	<10	10
1,1,2-Trichloro-			styrene	<5	5
1,2,2-trifluoroethane	<5	5	xylene	<5	5
methyl ethyl ketone	<10	10			

Comments: Analysis by U.S. EPA Method 8240, reported in micrograms per liter.

Analyst TJL, SL

Manager

Lewett R. Smith

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GC/MS Volatiles
Surrogate Standard Recovery Report

Kennedy/Jenks/Chilton

Laboratory Division
657 Howard Street
San Francisco, California 94105
415-362-6065

For Kennedy/Jenks/Chilton
Attention Owen Loshbough
Address 33301 Ninth Avenue South, Suite 100
Federal Way, WA 98003

Received 11/17/87
Reported 11/30/87

(K/J/C 866738.00)

<u>Sample Identification</u>		<u>Percent Recoveries</u>		
<u>Lab No.</u>	<u>Type</u>	<u>1,2-Dichloroethane-d4</u>	<u>Toluene-d8</u>	<u>4-Bromofluorobenzene</u>
877719	Soil	98	107	87
877719 Dup.	Soil	102	103	88

Acceptable Recoveries:

	<u>Water</u>	<u>Soil</u>
1,2-Dichloroethane-d4	76-114	70-121
Toluene-d8	88-110	81-117
4-Bromofluorobenzene	86-115	74-121

Analyst TJL, SL

Manager *Lawrence R. Smith*

Kennedy/Jenks/Chilton, Laboratory Division
657 Howard Street
San Francisco, CA 94105
415-362-6065

Received 11/17/87
Reported 11/30/87

Soil Analysis Report

For: Kennedy/Jenks/Chilton
Attn: Owen Loshbough
Address: 33301 Ninth Avenue South, Suite 100
Federal Way, WA 98003

(K/J/C 866738.00)

Lab. No.: 877720

Source: Sample I.D.: B-4
TIP Depth: 9-10.5 ft
Tacoma, WA

Date Collected: 11/12/87 Date Analyzed: 11/24/87

Time Collected: 1445

Collected by: K/J/C

Analysis	Units*	Analytical Results	Det. Limit
<u>PURGEABLES</u>			
Benzene	ug/Kg	<1	1
Chlorobenzene	ug/Kg	<1	1
1,2-Dichlorobenzene	ug/Kg	<1	1
1,3-Dichlorobenzene	ug/Kg	<1	1
1,4-Dichlorobenzene	ug/Kg	<1	1
Ethylbenzene	ug/Kg	<1	1
Toluene	ug/Kg	<1	1
o-xylene	ug/Kg	<1	1
m-xylene	ug/Kg	<1	1
p-xylene	ug/Kg	<1	1

Comments: Analysis by EPA Method 8020 (Purgeable Aromatics)

* Micrograms per kilogram, wet (as received) weight basis.

Analyst DC, SL

Manager Herbert R. Smith

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GC/MS Priority Pollutant Analysis

Kennedy/Jenks/Cilton, Laboratory Division

657 Howard Street
San Francisco, CA 94105
415-362-6065For Kennedy/Jenks/Cilton
Attention Owen Loshbough
Address 33301 Ninth Avenue South, Suite 100
Federal Way, WA 98003Received 11/18/87
Reported 11/25/87
(K/J/C 866738.00)

Lab. No. 877736

Source TIP

Date Collected 11/16/87

Time Collected 1530 Date Analyzed: 11/20/87

Collected by K/J/C

Sample Type: Water: MW-5

PRIORITY POLLUTANT COMPOUNDS

Volatiles	ug/L (ppb)		Volatiles	ug/L (ppb)	
	Det. Lim.			Det. Lim.	
chloromethane	<20	20	bromodichloromethane	<10	10
bromomethane	<20	20	1,2-dichloropropane	<10	10
vinyl chloride	<20	20	trans-1,3-dichloropropylene	<10	10
chloroethane	<20	20	trichloroethylene	<10	10
methylene chloride	<15	15	benzene	<10	10
acrolein	<60	60	dibromochloromethane	<10	10
acrylonitrile	<20	20	cis-1,3-dichloropropylene	<10	10
trichlorofluoromethane	200	10	1,1,2-trichloroethane	<10	10
1,1-dichloroethylene	<10	10	2-chloroethylvinyl ether	<10	10
1,1-dichloroethane	<10	10	bromoform	<10	10
1,2-dichloroethylene	<10	10	tetrachloroethylene	<10	10
Chloroform	<10	10	1,1,2,2-tetrachloroethane	<10	10
1,2-dichloroethane	<10	10	toluene	<10	10
1,1,1-trichloroethane	34	10	chlorobenzene	<10	10
carbon tetrachloride	<10	10	ethylbenzene	<10	10

NON-PRIORITY POLLUTANT COMPOUNDS

acetonitrile	<60	60	vinyl acetate	<20	20
acetone	<20	20	4-methyl-2-pentanone	<20	20
carbon disulfide	<10	10	2-hexanone	<20	20
1,1,2-Trichloro-			styrene	<10	10
1,2,2-trifluoroethane	<10	10	xylene	<10	10
methyl ethyl ketone	<20	20			

Comments: Analysis by U.S. EPA Method 8240, reported in micrograms per liter.

Analyst TJL, SLManager Everett R. Smith

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GC/MS Priority Pollutant Analysis

Kennedy/Jenks/Chilton, Laboratory Division

657 Howard Street

San Francisco, CA 94105

415-362-6065

For Kennedy/Jenks/Chilton
Attention Owen Loshbough
Address 33301 Ninth Avenue South, Suite 100
Federal Way, WA 98003

Received -
Reported 11/25/87
(K/J/C 866738.00)

Lab. No. Method Blank
Source -
Date Collected -
Time Collected - Date Analyzed: 11/19/87
Collected by K/J/C
Sample Type: Water: -

PRIORITY POLLUTANT COMPOUNDS

Volatiles	ug/L (ppb)		Volatiles	ug/L (ppb)	
	Det. Lim.			Det. Lim.	
chloromethane	<10	10	bromodichloromethane	<5	5
bromomethane	<10	10	1,2-dichloropropane	<5	5
vinyl chloride	<10	10	trans-1,3-dichloropropylene	<5	5
chloroethane	<10	10	trichloroethylene	<5	5
methylene chloride	<5	5	benzene	<5	5
acrolein	<30	30	dibromochloromethane	<5	5
acrylonitrile	<10	10	cis-1,3-dichloropropylene	<5	5
trichlorofluoromethane	<5	5	1,1,2-trichloroethane	<5	5
1,1-dichloroethylene	<5	5	2-chloroethylvinyl ether	<5	5
1,1-dichloroethane	<5	5	bromoform	<5	5
1,2-dichloroethylene	<5	5	tetrachloroethylene	<5	5
Chloroform	<5	5	1,1,2,2-tetrachloroethane	<5	5
1,2-dichloroethane	<5	5	toluene	<5	5
1,1,1-trichloroethane	<5	5	chlorobenzene	<5	5
carbon tetrachloride	<5	5	ethylbenzene	<5	5

NON-PRIORITY POLLUTANT COMPOUNDS

acetonitrile	<30	30	vinyl acetate	<10	10
acetone	<10	10	4-methyl-2-pentanone	<10	10
carbon disulfide	<5	5	2-hexanone	<10	10
1,1,2-Trichloro-			styrene	<5	5
1,2,2-trifluoroethane	<5	5	xylene	<5	5
methyl ethyl ketone	<10	10			

Comments: Analysis by U.S. EPA Method 8240, reported in micrograms per liter.

Analyst TJL, SLManager Genevett R. Smith

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Kennedy/Jenks/Chilton

GC/MS Volatiles
Surrogate Standard Recovery Report

Laboratory Division
657 Howard Street
San Francisco, California 94105
415-362-6065

For Kennedy/Jenks/Chilton
Attention Owen Loshbough
Address 33301 Ninth Avenue South, Suite 100
Federal Way, WA 98003

Received 11/18/87
Reported 11/25/87

(K/J/C 866738.00)

<u>Sample Identification</u>		<u>Percent Recoveries</u>		
<u>Lab No.</u>	<u>Type</u>	<u>1,2-Dichloroethane-d4</u>	<u>Toluene-d8</u>	<u>4-Bromofluorobenzene</u>
877636	Water	104	97	97

Acceptable Recoveries:

	<u>Water</u>	<u>Soil</u>
1,2-Dichloroethane-d4	76-114	70-121
Toluene-d8	88-110	81-117
4-Bromofluorobenzene	86-115	74-121

Analyst TJL, SL

Manager Levenett R. Smith

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Testing Laboratories, Inc.

940 South Harney St., Seattle, Washington 98108 (206)767-5060



Certificate

Chemistry, Microbiology, and Technical Services

CLIENT: Kennedy Jenks Chilton Consulting Engineers
33301 Ninth Ave. S., Suite 100
Federal Way, WA 98003
ATTN: Dana Grant

LABORATORY NO. 7763

DATE: Feb. 2, 1988

REPORT ON: MATERIAL (Tar solids)

SAMPLE

IDENTIFICATION: Submitted 1/13/88

Sample was analyzed qualitatively and semi-quantitatively for the purpose of a waste profile sheet.

Note: Large chunks of the sample were ground with a mortar and pestal in order to achieve a more uniform composite sample for analysis.

Physical Characteristics

Color -----	black
Physical state @ 70 degrees F -----	solid
Layers -----	single-phased
Free liquid -----	No
pH, glass electrode @ 25 degrees C, 1:1 DIW slurry -----	5.0
Odor -----	phenolic
Debris -----	No
Total Solids, % by weight -----	90.5
Viscosity -----	N/A
Specific gravity @ 25 degrees C -----	N/A
Flash point -----	>200°F



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PAGE NO. 2

Kennedy Jenks Chilton

LABORATORY NO. 7763

Chemical Composition

The material was a single-phased large chunky black solid with 11 ppm phenol.

Total Solids @ 105°C ----- 90.5%

Moisture and Volatile Matter @ 105°C ----- 9.5%

E.P. Tox Metals

parts per million

Arsenic	<0.2
Barium	<0.1
Cadmium	<0.01
Chromium	<0.1
Mercury	<0.005
Lead	<0.1
Selenium	<0.2
Silver	<0.1
Copper	<0.1
Nickel	<0.1
Zinc	<0.1
Thallium	<2.



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Kennedy Jenks Chilton

LABORATORY NO. 7763

Other Components

Total basis, parts per million

Cyanides	<10.
Phenolics	11.
Amines	N/A
PCBs	N/A
Sulfides	<20.

Hazardous Characteristics

None Reactive

Dangerous Waste Criteria

Sample was not examined.



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PAGE NO. 4

Kennedy Jenks Chilton

LABORATORY NO. 7763

Comments

Some of the above observations were based on information submitted by our client and by physical observations only.

If you have reason to believe other components or hazardous characteristics are present, appropriate changes should be made when filling out the waste manifest sheet.

When filling out the manifest sheet, any value here shown as N/A (not applicable), should be recorded as a zero or as less than some value if you are confident there is no source for the item.

Key

< = less than

> = greater than

Respectfully submitted,

Laucks Testing Laboratories, Inc.

Therese Lombard

TL:veg



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Laucks

Testing Laboratories, Inc.

940 South Harney St., Seattle, Washington 98108 (206)767-5060



Certificate

Chemistry, Microbiology and Technical Services

CLIENT: Kennedy Jenks Chilton Consulting Engineers
33301 Ninth Avenue South, Suite 100
Federal Way, WA 98003
ATTN: Dana Grant

LABORATORY NO. 8185

DATE: Feb. 29, 1988

Job No. 866738

REPORT ON: MATERIAL

SAMPLE

IDENTIFICATION: Submitted 02/05/88 and identified as shown below:

TIP B-5-9 11/19/87 (*Drum solids*)

TESTS PERFORMED AND RESULTS:

The sample was analyzed using GC-Ion Trap methods of analysis for solvent identification with results as follows:

F001 - F005 Solvents

	<u>%</u>
Acetone	<0.02
n-Butyl alcohol	<0.05
Carbon Disulfide	<0.02
Carbontetrachloride	<0.02
Chlorobenzene	<0.02
Cresols (and cresylic acid)	<0.1
Cyclohexanone	<0.2
1,2-Dichlorobenzene	<0.02
Ethyl acetate	<0.02
Ethyl benzene	<0.02
Ethyl ether	<0.02
Isobutanol	<0.02



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PAGE NO. 2

Kennedy Jenks Chilton Consulting Engineers

LABORATORY NO. 8185

F001 - F005 Solvents

	<u>%</u>
Methanol	<0.2
Methylene chloride	<0.02
Methyl ethyl ketone	<0.02
Methyl isobutyl ketone	<0.04
Nitrobenzene	<0.04
Pyridine	<0.04
Tetrachloroethylene	<0.02
Toluene	<0.01
1,1,1-Trichloroethane	<0.03
1,1,2-Trichlorotrifluoroethane	<0.02
Trichloroethylene	<0.01
Trichlorofluoromethane	<0.01
Xylene	<0.01

Total F List Solvents ----- Less than 1.0%

Solvents

	<u>%</u>
Benzene	<0.1
2-Butanone	<0.1
n-Butyl acetate	<0.1
Butyl cellosolve	<0.1
Cellosolve acetate	<0.1
Cellosolve(ethyl)	<0.5
Chloroform	<0.1
Cyclohexane	<0.1



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Chemistry Microbiology and Technical Services

PAGE NO. 3

Kennedy Jenks Chilton Consulting Engineers

LABORATORY NO. 8185

<u>Solvents</u>	<u>%</u>
Di-isopropyl ether	<0.2
Diacetone alcohol	<0.1
1,4-Dichlorobenzene	<0.1
1,2-Dichloroethane	<0.1
t-1,2-Dichloroethylene	<0.2
1,2-Diethylbenzene	<0.1
1,4-Dioxane	<0.1
2(2ethoxyethoxy)ethanol)	<2.
Ethyl formate	<0.1
n-Hexane	<0.1
2-Hexanone	<0.2
Iso-octane	<0.1
Isobutyl acetate	<0.1
Isopropanol	<0.1
Isopropyl acetate	<0.1
Mesitylene oxide	<0.1
(2(2Methoxyethoxy)ethanol)	<2.
Methyl cellosolve	<1.
2-Nitropropane	<0.1
2,4-Pentadione	<0.1
Phenyl cellosolve	<1.
n-Propanol	<0.5
Styrene	<0.1
1,1,2,2-Tetrachloroethane	<0.1
Tetrahydrofuran	0.03
Tetramethylbenzenes	<0.1
1,1,2-Trichloroethane	<0.1
Trimethyl benzenes	<0.1



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Testing Laboratories, Inc.

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Chemistry, Microbiology, and Technical Services

PAGE NO. 4

Kennedy Jenks Chilton Consulting Engineers

LABORATORY NO. 8185

Sample analyzed for Gravimetric Polycyclic Aromatic Hydrocarbons in accordance with Washington State Department of Ecology WAC 173-303. The method requires analysis of the samples through successive stages until the result obtained is less than 1% by weight (as received basis) or until the fourth stage has been completed. Results are as shown below:

Stage	<u>% by weight, as received basis</u>
1: Soxhlet Extraction	11.2
Acid-base	
2: clean up	8.08
Silica gel	
3: chromatography	6.91
High Performance	
4: Liquid Chromatography (HPLC) Analysis	3.65

Comment

The reported results for the 4-, 5-, and 6-ring PNAs are based on a correction of the results of the silica gel fractionation for the concentrations of the 2- and 3-ring PNAs in the residue from the silica gel fractionation. The concentrations of the 2- and 3-ring PNAs were determined by HPLC. This calculation is performed in accordance with the method as written.

A qualitative review of the elution region for the 4-, 5-, and 6-ring PNAs in the HPLC chromatogram indicates that the correction factor derived as previously described does not accurately quantify the 4-, 5-, and 6-ring PNAs in this sample. Further confirmatory work, such as GC/MS, may be required to more accurately quantify these compounds in this sample.



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Testing Laboratories, Inc.

940 South Harney St., Seattle, Washington 98108 (206)767-5060



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Chemistry, Microbiology, and Technical Services

PAGE NO. 5

Kennedy Jenks Chilton Consulting Engineers

LABORATORY NO. 8185

Key

< indicates "less than"

Respectfully submitted,

Laucks Testing Laboratories, Inc.

J. M. Owens

JMO:emt



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Chemistry Microbiology and Technical Services

APPENDIX

Copy of Chain-of-Custody is Attached



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Chemistry, Microbiology and Technical Services



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PAGE NO. 11

Kennedy Jenks Chilton Consulting Engineers

LABORATORY NO. 7225

Sample No. 5

5

Ignitability

Note A

Note A = Does not flash at, or less than 200°F, when tested in a Setaflash tester (and does not burn when exposed to open flame).

Sample No. 5 was analyzed for E.P. Toxicity in accordance with Test Methods for Evaluating Solid Waste, (SW 846), U.S.E.P.A., November, 1986. Extraction was performed using Method 1310. Mercury was determined using Method 7470; other metals performed by ICAP, Method 6010.

parts per million (mg/L)

	<u>5</u>	<u>MCL</u>
Arsenic	L/0.2	5.0
Barium	0.6	100.
Cadmium	L/0.01	1.0
Chromium	L/0.1	5.0
Lead	L/0.1	5.0
Mercury	L/0.005	0.2
Selenium	L/0.2	1.0
Silver	L/0.1	5.0

Comment:

Due to insufficient sample, less than the required 100 gm weight was extracted, proportionally.

Sample size extracted: 17.3g



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Chemistry, Microbiology and Technical Services

PAGE NO. 12

Kennedy Jenks Chilton Consulting Engineers

LABORATORY NO. 7225

Sample No. 6

	<u>6</u>
Total Solids, %	94.5
	<u>parts per million (mg/kg), dry basis</u>
Oil & Grease	5,700.

Sample No. 6 was analyzed for Halogenated Hydrocarbons in accordance with Washington State Department of Ecology WAC 173-303 with results as follows:

	<u>parts per million (mg/kg), as received basis</u>
	<u>6</u>
Halogenated Hydrocarbons*	44.

*Reported as the sum of the halogens bromide, chloride fluoride and iodide.
A value of less than 100 mg/kg is classified as undesignated waste.



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Chemistry, Microbiology, and Technical Services

PAGE NO. 13

Kennedy Jenks Chilton Consulting Engineers

LABORATORY NO. 7225

Sample No. 6

6

Ignitability

Note A

Note A = Does not flash at, or less than 200°F, when tested in a Setaflash tester (and does not burn when exposed to open flame).

Sample No. 6 was analyzed for E.P. Toxicity in accordance with Test Methods for Evaluating Solid Waste, (SW 846), U.S.E.P.A., November, 1986. Extraction was performed using Method 1310. Mercury was determined using Method 7470; other metals performed by ICAP, Method 6010.

parts per million (mg/L)

	<u>6</u>	<u>MCL</u>
Arsenic	L/0.2	5.0
Barium	1.4	100.
Cadmium	0.06	1.0
Chromium	L/0.1	5.0
Lead	0.3	5.0
Mercury	L/0.005	0.2
Selenium	L/0.2	1.0
Silver	L/0.1	5.0

Comment:

Due to insufficient sample, less than the required 100 gm weight was extracted, proportionally.

Sample size extracted: 17.8 g



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Chemistry, Microbiology, and Technical Services

PAGE NO. 14

Kennedy Jenks Chilton Consulting Engineers

LABORATORY NO. 7225

Comments:

Some of the above observations were based on information submitted by our client and physical observations only.

If you have reason to believe other components or hazardous characteristics are present, appropriate changes should be made when filling out the waste manifest sheet.

When filling out the manifest sheet, any value here shown as N/A (not applicable), should be recorded as a zero or as less than some value if you are confident there is no source for the item.

Key

< indicates "less than"

MCL = Maximum Contamination Level allowed per regulation.

Respectfully submitted,

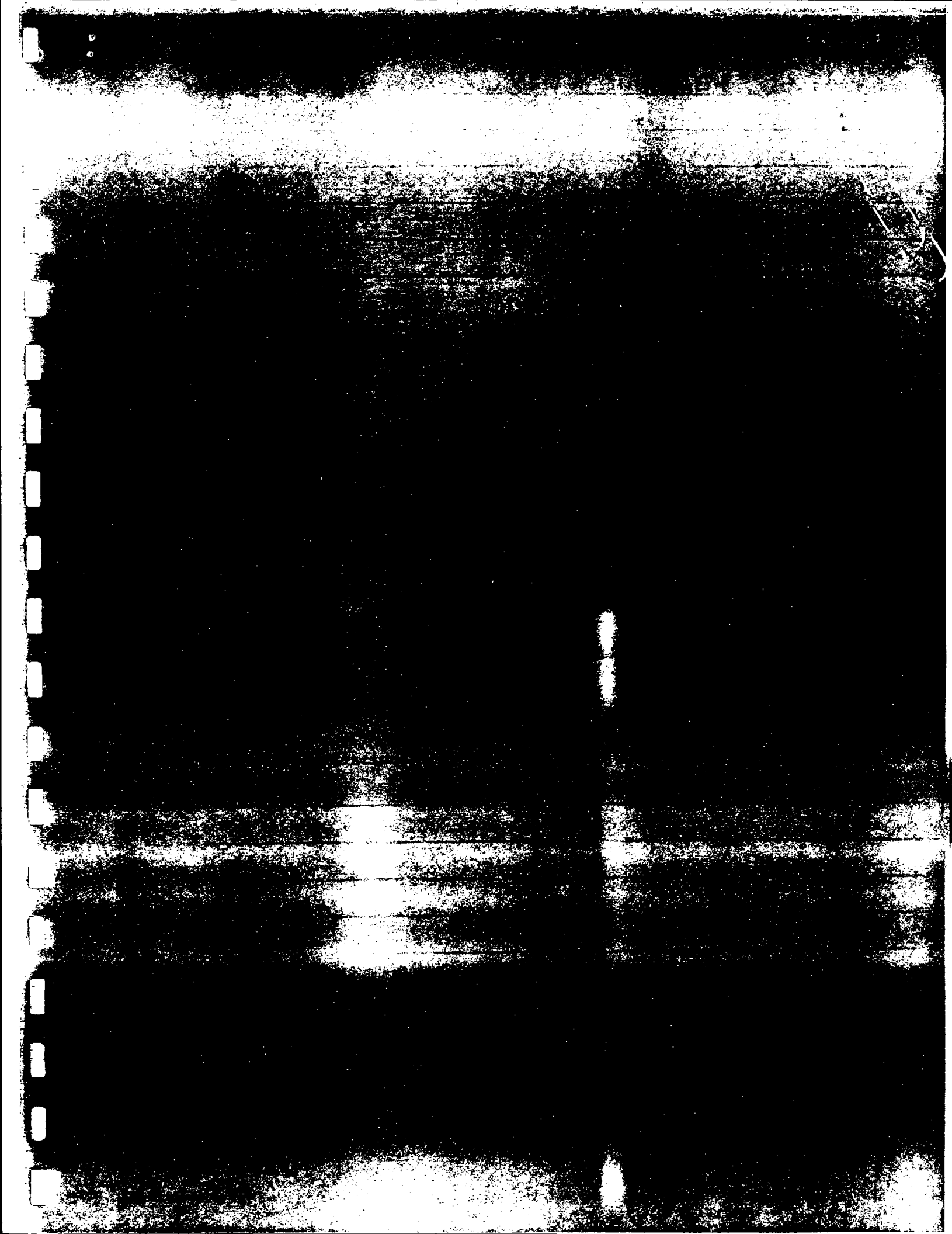
Laucks Testing Laboratories, Inc.

J. M. Owens

JMO:1aj



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CHEMICAL PROCESSORS, INC./RESOURCE RECOVERY CORP.

2203 Airport Way So., Suite 400 • Seattle, WA 98134
 Chempro 223-0500 • Resource Recovery 223-0900

Please print or type
 (Form designed for use on elite (12-pitch) typewriter.)

Form Approved OMB No. 2050-0039 Expires 9-30-88

UNIFORM HAZARDOUS WASTE MANIFEST		1. Generator's US EPA ID No. WAD980836266 107105		Manifest Document No.		2. Page 1 of 1		Information in the shaded areas is not required by Federal law.	
3. Generator's Name and Mailing Address TIP Management Inc CS 2259 1123 Port of Tacoma Rd Tacoma, WA 98401						A. State Manifest Document Number			
4. Generator's Phone ()						B. State Generator's ID			
5. Transporter 1 Company Name CROWLEY ENVIRONMENTAL SERVICES						6. US EPA ID Number WAD061692498		C. State Transporter's ID	
7. Transporter 2 Company Name						8. US EPA ID Number		D. Transporter's Phone 682 4898	
9. Designated Facility Name and Site Address <input checked="" type="checkbox"/> Chempro 734 So. Lucile St. Seattle, WA (206) 767-3362 <input type="checkbox"/> Chempro Pier 91 Seattle, WA (206) 284-2450 <input type="checkbox"/> Chempro 1701 Alexander Tacoma, WA (206) 627-7568 <input type="checkbox"/> McClary/Columbia 625 So. 32nd St. Washougal, WA (206) 835-8594 <input type="checkbox"/> Other:						10. US EPA ID Number WAD 000812909 WAD 000812917 WAD 020257945 WAD 092300250		E. State Transporter's ID	
								F. Transporter's Phone	
								G. State Facility's ID	
								H. Facility's Phone 767-3362	
11. US DOT Description (Including Proper Shipping Name, Hazard Class, and ID Number)						12. Containers		13. Total Quantity	
						No. Type		Unit	
a. WASTE COMBUSTIBLE Liquid N.O.S. COMBUSTIBLE Liquid NA-1993						1 11		800	
b.								6	
c.									
d.									
J. Additional Descriptions for Materials Listed Above						K. Handling Codes for Wastes Listed Above			
15. Special Handling Instructions and Additional Information a) CP 14019									
16. GENERATOR'S CERTIFICATION: I hereby declare that the contents of this consignment are fully and accurately described above by proper shipping name and are classified, packed, marked, and labeled, and are in all respects in proper condition for transport by highway according to applicable international and national government regulations. If I am a large quantity generator, I certify that I have a program in place to reduce the volume and toxicity of waste generated to the degree I have determined to be economically practicable and that I have selected the practicable method of treatment, storage, or disposal currently available to me which minimizes the present and future threat to human health and the environment, OR, if I am a small quantity generator, I have made a good faith effort to minimize my waste generation and select the best waste management method that is available to me and that I can afford.									
Printed/Typed Name Thomas R. Anderson						Signature Thomas R. Anderson		Month Day Year 12 9 88	
17. Transporter 1 Acknowledgement of Receipt of Materials									
Printed/Typed Name MIKE E. HAZSCHUTT						Signature Mike E. Hazschutt		Month Day Year 3 15 88	
18. Transporter 2 Acknowledgement of Receipt of Materials									
Printed/Typed Name						Signature		Month Day Year	
19. Discrepancy Indication Space									
20. Facility Owner or Operator: Certification of receipt of hazardous materials covered by this manifest except as noted in item 19. FOR CHEMPRO									
Printed/Typed Name LYNN M. FRANTARE						Signature Lynn M. Frantare		Month Day Year 3 15 88	

CHEMICAL PROCESSORS, INC./RESOURCE RECOVERY CORP.

07151

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Form Approved OMB No 2050-0039 Expires 9-30-8

UNIFORM HAZARDOUS WASTE MANIFEST		1. Generator's US EPA ID No. WAD 980836266		Manifest Document No. 107151		2. Page 1 of 1		Information in the shaded areas is not required by Federal law.							
3. Generator's Name and Mailing Address TIP Management CS 2259 1123 Port of Tacoma Rd Tacoma WA 98401						A. State Manifest Document Number									
4. Generator's Phone (206) 838-3545						B. State Generator's ID									
5. Transporter 1 Company Name Crowley Environmental Services						C. State Transporter's ID									
6. US EPA ID Number WAD 061682496						D. Transporter's Phone 682-4898									
7. Transporter 2 Company Name						E. State Transporter's ID									
8. US EPA ID Number						F. Transporter's Phone									
9. Designated Facility Name and Site Address <input checked="" type="checkbox"/> Chempro 734 So. Lucile St. Seattle, WA (206) 767-3362 <input type="checkbox"/> Chempro Pier 91 Seattle, WA (206) 284-2450 <input type="checkbox"/> Chempro 1701 Alexander Tacoma, WA (206) 627-7568 <input type="checkbox"/> McClary/Columbia 625 So. 32nd St. Washougal, WA (206) 835-8594 <input type="checkbox"/> Other:						10. US EPA ID Number WAD 000812809 WAD 000812917 WAD 020257945 WAD 092300250									
						G. State Facility's ID									
						H. Facility's Phone 767-3362									
11. US DOT Description (Including Proper Shipping Name, Hazard Class, and ID Number)						12. Containers		13. Total Quantity		14. Unit Wt/Vol		15. Waste No.			
a. <input checked="" type="checkbox"/> WASTE Flammable Solid N.O.S. Flammable Solid UN 1325						43 DM		220 165		G		WPOZ 0001			
b. <input checked="" type="checkbox"/> WASTE Acid Liquid N.O.S. CORROSIVE MATERIAL NA 1760						1 DM		55		G		0002			
c.															
d.															
J. Additional Descriptions for Materials Listed Above						K. Handling Codes for Wastes Listed Above									
15. Special Handling Instructions and Additional Information a) CP14021 b) CP14020															
16. GENERATOR'S CERTIFICATION: I hereby declare that the contents of this consignment are fully and accurately described above by proper shipping name and are classified, packed, marked, and labeled, and are in all respects in proper condition for transport by highway according to applicable international and national government regulations. If I am a large quantity generator, I certify that I have a program in place to reduce the volume and toxicity of waste generated to the degree I have determined to be economically practicable and that I have selected the practicable method of treatment, storage, or disposal currently available to me which minimizes the present and future threat to human health and the environment, OR, if I am a small quantity generator, I have made a good faith effort to minimize my waste generation and select the best waste management method that is available to me and that I can afford.															
Printed/Typed Name Thomas R. Anderson						Signature Thomas R. Anderson						Month Day Year 2 9 88			
17. Transporter 1 Acknowledgement of Receipt of Materials						Printed/Typed Name Robert A Sandell						Signature Robert A Sandell		Month Day Year 3 15 88	
18. Transporter 2 Acknowledgement of Receipt of Materials						Printed/Typed Name						Signature		Month Day Year	
19. Discrepancy Indication Space CHANGES MADE PER DANA GRANT AT KENNEDY/ JINKS/SNELTON 3/15/88															
20. Facility Owner or Operator: Certification of receipt of hazardous materials covered by this manifest except as noted in item 19. J. CHEMPRO															
Printed/Typed Name LYNN M. FRONTAO						Signature Lynn M. Fronto						Month Day Year 3 15 88			

CHEMICAL PROCESSORS, INC./RESOURCE RECOVERY CORP.

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UNIFORM HAZARDOUS WASTE MANIFEST		1. Generator's US EPA ID No.	Manifest Document No.	2. Page 1 of 1	Information in the shaded areas is not required by Federal law.	
3. Generator's Name and Mailing Address CHEMPRO 734 So. Lucile St. Seattle, WA 98108				A. State Manifest Document Number		
4. Generator's Phone ()				B. State Generator's ID		
5. Transporter 1 Company Name CHEMPRO 734 So. Lucile St. Seattle, WA 98108		6. US EPA ID Number WAD 000812909		C. State Transporter's ID		
7. Transporter 2 Company Name		8. US EPA ID Number		D. Transporter's Phone ()		
9. Designated Facility Name and Site Address <input checked="" type="checkbox"/> Chempro 734 So. Lucile St. Seattle, WA (206) 767-3362 <input type="checkbox"/> Chempro Pier 91 Seattle, WA (206) 284-2450 <input type="checkbox"/> Chempro 1701 Alexander Tacoma, WA (206) 627-7568 <input type="checkbox"/> McClary/Columbia 625 So. 32nd St. Washougal, WA (206) 835-8594 <input type="checkbox"/> Other:		10. US EPA ID Number WAD 000812909 WAD 000812917 WAD 020257945 WAD 092300250		E. State Transporter's ID		
				F. Transporter's Phone		
				G. State Facility's ID		
				H. Facility's Phone 767-3362		
11. US DOT Description (Including Proper Shipping Name, Hazard Class, and ID Number)				12. Containers	13. Total Quantity	14. Unit Wt/Vol
				No.	Type	L. Waste No.
a. <i>HAZARDOUS WASTE</i>				1	TI	6
b.						
c.						
d.						
J. Additional Descriptions for Materials Listed Above				K. Handling Codes for Wastes Listed Above		
15. Special Handling Instructions and Additional Information						
16. GENERATOR'S CERTIFICATION: I hereby declare that the contents of this consignment are fully and accurately described above by proper shipping name and are classified, packed, marked, and labeled, and are in all respects in proper condition for transport by highway according to applicable international and national government regulations. If I am a large quantity generator, I certify that I have a program in place to reduce the volume and toxicity of waste generated to the degree I have determined to be economically practicable and that I have selected the practicable method of treatment, storage, or disposal currently available to me which minimizes the present and future threat to human health and the environment, OR, if I am a small quantity generator, I have made a good faith effort to minimize my waste generation and select the best waste management method that is available to me and that I can afford.						
Printed/Typed Name Thomas R. Anderson				Signature Thomas R. Anderson		Month Day Year 2 7 88
17. Transporter 1 Acknowledgement of Receipt of Materials						
Printed/Typed Name Mark Anderson				Signature Mark Anderson		Month Day Year 5 11 88
18. Transporter 2 Acknowledgement of Receipt of Materials						
Printed/Typed Name				Signature		Month Day Year
19. Discrepancy Indication Space						
20. Facility Owner or Operator: Certification of receipt of hazardous materials covered by this manifest except as noted in item 19.						
Printed/Typed Name				Signature		Month Day Year

CHEMICAL PROCESSORS, INC./RESOURCE RECOVERY CORP.

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Form Approved OMB No. 2050-0039 Expires 9-30-88

UNIFORM HAZARDOUS WASTE MANIFEST		1. Generator's US EPA ID No.		Manifest Document No.	2. Page 1 of 1		Information in the shaded areas is not required by Federal law.		
3. Generator's Name and Mailing Address					A. State Manifest Document Number				
4. Generator's Phone ()					B. State Generator's ID				
5. Transporter 1 Company Name			US EPA ID Number		C. State Transporter's ID				
7. Transporter 2 Company Name			8. US EPA ID Number		D. Transporter's Phone				
					E. State Transporter's ID				
					F. Transporter's Phone				
9. Designated Facility Name and Site Address			10. US EPA ID Number		G. State Facility's ID				
<input checked="" type="checkbox"/> Chempro 734 So. Lucile St. Seattle, WA (206) 767-3362 <input type="checkbox"/> Chempro Pier 91 Seattle, WA (206) 284-2450 <input type="checkbox"/> Chempro 1701 Alexander Tacoma, WA (206) 627-7568 <input type="checkbox"/> McClary/Columbia 625 So. 32nd St. Washougal, WA (206) 835-8594 <input type="checkbox"/> Other:			<input checked="" type="checkbox"/> WAD 000812909 <input type="checkbox"/> WAD 000812917 <input type="checkbox"/> WAD 020257945 <input type="checkbox"/> WAD 092300250		<input checked="" type="checkbox"/> Facility's Phone				
11. US DOT Description (Including Proper Shipping Name, Hazard Class, and ID Number)					12. Containers		13. Total Quantity	14. Unit Wt/Vol	1. Waste No.
					No.	Type			
a.					3		165		
b.					1				
c.									
d.									
J. Additional Descriptions for Materials Listed Above						K. Handling Codes for Wastes Listed Above			
15. Special Handling Instructions and Additional Information									
<p>16. GENERATOR'S CERTIFICATION: I hereby declare that the contents of this consignment are fully and accurately described above by proper shipping name and are classified, packed, marked, and labeled, and are in all respects in proper condition for transport by highway according to applicable international and national government regulations.</p> <p>If I am a large quantity generator, I certify that I have a program in place to reduce the volume and toxicity of waste generated to the degree I have determined to be economically practicable and that I have selected the practicable method of treatment, storage, or disposal currently available to me which minimizes the present and future threat to human health and the environment. OR, if I am a small quantity generator, I have made a good faith effort to minimize my waste generation and select the best waste management method that is available to me and that I can afford.</p>									
Printed/Typed Name					Signature		Month	Day	Year
Therese R. Anderson					Therese R. Anderson		2	1	88
17. Transporter 1 Acknowledgement of Receipt of Materials									
Printed/Typed Name					Signature		Month	Day	Year
Therese R. Anderson					Therese R. Anderson		2	1	88
18. Transporter 2 Acknowledgement of Receipt of Materials									
Printed/Typed Name					Signature		Month	Day	Year
19. Discrepancy Indication Space									
20. Facility Owner or Operator: Certification of receipt of hazardous materials covered by this manifest except as noted in item 19.									
Printed/Typed Name					Signature		Month	Day	Year

Field Sample Chain of Custody Record

Source of Sample(s) TIPCollector Dana Grant

Address _____

Affiliation K/J/C

Phone () _____

Address 33301 9TH AVE Suite 1Federal Way, WA 9800Report to (1) Dana GrantPhone (206) 874-0555

Sample Information

K/J/C Job Number 866738

Lab No. Field No. Date Time Type (2)

Flow
RateRemarks (Suspected Contaminants,
Field Conditions, etc.)B-5-9 1 1 solidPAH1 1Solvent ID1 11 11 11 11 11 1

Chain of Possession

	Relinquished by (Signature and affiliation)	Date	Time	Received by (3) (Signature and affiliation)	Date	Time
1.	<u>Dana Grant</u>	<u>2 5 1988</u>	<u>1:50 PM</u>	<u>Frank Collins</u>	<u>2 5 1988</u>	<u>1</u>
2.	_____	<u>1 1</u>	_____	_____	<u>1 1</u>	_____
	_____	_____	_____	_____	_____	_____
	_____	_____	_____	_____	_____	_____

Logged in at K/J/C by _____ 1 1

- (1) There is a separate Request for Analysis form that should be filled out by the collector and given to the Laboratory when samples are delivered.
- (2) e.g. water, sludge, soil, etc.
- (3) If any samples are not intact at time of transfer, please describe on the back of the form.

Laucks

Testing Laboratories, Inc.

940 South Harney St., Seattle, Washington 98108 (206)767-5060



Certificate

Chemistry, Microbiology, and Technical Services

CLIENT: Kennedy Jenks Chilton Consulting Engineers
33301 Ninth Avenue South, Suite 100
Federal Way, WA 98003
ATTN: Nathan Graves

LABORATORY NO. 7225

DATE: Jan. 4, 1988

Job No. 866738

REPORT ON: LIQUIDS AND SOLIDS

SAMPLE

IDENTIFICATION: Submitted 12/03/87 and identified as shown below:

- | | | |
|---------------------|----------|----------|
| 1) Composite | 12/01/87 | (liquid) |
| 2) B-4 | 12/02/87 | (acid) |
| 3) BT-3 | 12/02/87 | (sludge) |
| 4) Composite Solids | 12/02/87 | (solids) |
| 5) C-10 | 12/02/87 | (solids) |
| 6) C-9 | 12/02/87 | (solids) |

(Drummed material)

TESTS PERFORMED AND RESULTS:

Sample No. 1

Sample No. 1 was analyzed for Halogenated Hydrocarbons in accordance with Washington State Department of Ecology WAC 173-303 with results as follows:

parts per million (mg/kg), as received basis

1

Halogenated Hydrocarbons*

38.

*Reported as the sum of the halogens bromide, chloride fluoride and iodide.
A value of less than 100 mg/kg is classified as undesignated waste.



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Certificate

Chemistry, Microbiology and Technical Services

PAGE NO. 2

Kennedy Jenks Chilton Consulting Engineers

LABORATORY NO. 7225

Sample No. 1

Sample No. 1 was analyzed qualitatively and semi-quantitatively for the purpose of classification for a waste profile sheet with observations and results as follow:

Physical Characteristics

Color -----	Bi-Layered
	Top: Black
	Bottom: Light Brown
Physical State at 70 degrees F -----	Liquid
Layers -----	Bi-Layered
	Top: 15%
	Bottom: 85%
Free Liquid -----	98.4%
pH, glass electrode at 25 degrees C -----	7.5
Odor -----	Oil/Solvent
Debris -----	Sediment
Total Solids (by weight) -----	5.7%
Viscosity -----	Top: Oil
	Bottom: Water
Specific Gravity -----	0.91
Flash Point -----	101-139°F

Chemical Composition

The material was bi-layered with a top black oil and solvent phase (15% of the total by volume) and a bottom light brown aqueous phase (85% of the total by volume).

Gas chromatographic analysis by ion trap and total solids were performed with results as follows:

Total Solids at 105°C -----	5.7%
Toluene -----	0.1%
Xylene -----	0.6%
1,3,5-Trimethylbenzene -----	1.5%
1,3-Diethylbenzene -----	0.1%
1,2,4-Trimethylbenzene -----	4.8%
Other Alkyl Benzenes -----	6.0% (approximately)
Moisture (by difference) -----	81.2%



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Chemistry, Microbiology, and Technical Services

PAGE NO. 3

Kennedy Jenks Chilton Consulting Engineers

LABORATORY NO. 7225

Sample No. 1

Sample 1 was analyzed for E.P. Toxicity in accordance with Test Methods for Evaluating Solid Waste, (SW 846), U.S.E.P.A., November, 1986. Extraction was performed using Method 1310. Mercury was determined using Method 7470; other metals performed by ICAP, Method 6010.

EP Tox Metals

parts per million

Arsenic	L/0.2
Barium	1.3
Cadmium	L/0.01
Chromium	L/0.1
Mercury	L/0.005
Lead	0.1
Selenium	L/0.2
Silver	L/0.1
Copper	L/0.1
Nickel	L/0.1
Zinc	2.3
Thallium	L/2.

Other Components

Cyanides	L/10.
Phenols	L/10.
Amines	N/A
PCBs	N/A
Sulfides	L/20.

Hazardous Characteristics

None Reactive

Dangerous Waste Criteria

Sample Examined ----- No



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LABORATORY NO. 7225

Sample No. 2

Acidity, calculated as % HCL
to methyl orange end point ----- 30.0

Total Metals

parts per million

2

Arsenic
Barium
Cadmium
Chromium
Mercury
Lead
Selenium
Silver
Copper
Nickel
Zinc
Thallium

L/5.
L/2.
L/1.
L/2.
L/5.
L/2.
L/5.
L/2.
L/2.
L/2.
L/2.
L/50.



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Sample No. 3

Sample No. 3 was analyzed for Halogenated Hydrocarbons in accordance with Washington State Department of Ecology WAC 173-303 with results as follows:

parts per million (mg/kg), as received basis

3

Halogenated Hydrocarbons*

210.

*Reported as the sum of the halogens bromide, chloride fluoride and iodide.
A value of 100-10,000 ppm is classified as dangerous waste.

Sample No. 3 was analyzed qualitatively and semi-quantitatively for the purpose of classification for a waste profile sheet with observations and results as follow:

Physical Characteristics

Color -----	Black
Physical State at 70 degrees F -----	Semi-Solid
Layers -----	Single Phased
Free Liquid -----	No
pH (1:1 DIW slurry), glass electrode at 25 degrees C -----	4.2
Odor -----	Tar/Solvent
Debris -----	No
Total Solids (by weight) -----	47.2%
Viscosity -----	N/A
Specific Gravity -----	N/A
Flash Point -----	L/70°F



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Sample No. 3

Chemical Composition

The material was a single phased black semi-solid with a solvent/tar-like odor.

Gas chromatographic analysis by ion trap and total solids were performed with results as follows:

Total Solids at 105°C -----	47.2%
Toluene -----	0.3%
Xylene -----	0.6%
n-Hexane -----	1.2%
Cyclohexane -----	5.3%
Octane -----	5.6%
Nonane -----	5.5%
1,3,5-Trimethylbenzene -----	0.1%
1,2,4-Trimethylbenzene -----	0.1%
A light hydrocarbon pattern including a gasoline pattern (by difference) -----	34.1%



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LABORATORY NO. 7225

Sample No. 3

Sample 3 was analyzed for E.P. Toxicity in accordance with Test Methods for Evaluating Solid Waste, (SW 846), U.S.E.P.A., November, 1986. Extraction was performed using Method 1310. Mercury was determined using Method 7470; other metals performed by ICAP, Method 6010.

EP Tox Metals

parts per million

Arsenic	L/0.2
Barium	L/0.1
Cadmium	L/0.01
Chromium	L/0.1
Mercury	L/0.005
Lead	L/0.1
Selenium	L/0.2
Silver	L/0.1
Copper	L/0.1
Nickel	L/0.1
Zinc	L/0.1
Thallium	L/2.

Other Components

Cyanides	L/10.
Phenols	L/10.
Amines	N/A
PCBs	N/A
Sulfides	L/20.

Hazardous Characteristics

None Reactive

Dangerous Waste Criteria

Sample Examined ----- No



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Sample No. 4

	<u>4</u>
Total Solids, %	97.0
	<u>parts per million (mg/kg), dry basis</u>
Oil & Grease	340.

Sample No. 4 was analyzed for Halogenated Hydrocarbons in accordance with Washington State Department of Ecology WAC 173-303 with results as follows:

	<u>parts per million (mg/kg), as received basis</u>
	<u>4</u>
Halogenated Hydrocarbons*	15.

*Reported as the sum of the halogens bromide, chloride fluoride and iodide.
A value of less than 100 mg/kg is classified as undesignated waste.



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Sample No. 4

4

Ignitability

Note A

Note A = Does not flash at, or less than 200°F, when tested in a Setaflash tester (and does not burn when exposed to open flame).

Sample No. 4 was analyzed for E.P. Toxicity in accordance with Test Methods for Evaluating Solid Waste, (SW 846), U.S.E.P.A., November, 1986. Extraction was performed using Method 1310. Mercury was determined using Method 7470; other metals performed by ICAP, Method 6010.

parts per million (mg/L)

	<u>4</u>	<u>MCL</u>
Arsenic	L/0.2	5.0
Barium	0.2	100.
Cadmium	L/0.01	1.0
Chromium	L/0.1	5.0
Lead	L/0.1	5.0
Mercury	L/0.005	0.2
Selenium	L/0.2	1.0
Silver	L/0.1	5.0

Comment:

Due to insufficient sample, less than the required 100 gm weight was extracted, proportionally.

Sample size extracted: 94.3 g



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Sample No. 5

	<u>5</u>
Total Solids, %	77.6
	<u>parts per million (mg/kg), dry basis</u>
Oil & Grease	180.

Sample No. 5 was analyzed for Halogenated Hydrocarbons in accordance with Washington State Department of Ecology WAC 173-303 with results as follows:

	<u>parts per million (mg/kg), as received basis</u>
	<u>5</u>
Halogenated Hydrocarbons*	30.

*Reported as the sum of the halogens bromide, chloride fluoride and iodide.
A value of less than 100 mg/kg is classified as undesignated waste.



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